



THE METROPOLITAN WATER DISTRICT  
OF SOUTHERN CALIFORNIA

*Office of the General Manager*

June 10, 2011

Delta Stewardship Council  
980 Ninth Street, Suite 1500  
Sacramento, CA 95814

**Sent via e-mail to Individual Council Members  
and Council Executive Director**

Dear Chairman Isenberg and Members of the Council:

Specific Revisions to Third Staff Draft Delta Plan

The Metropolitan Water District of Southern California (Metropolitan) previously submitted comments to the Council on the Third Staff Draft Delta Plan (Draft Plan) that addressed several areas of remaining concern we have with the Plan's ability to achieve the co-equal goals of ecosystem restoration for the Delta and water supply reliability for California. Upon further review of the Third Draft Plan, Metropolitan developed suggested revisions that address many of our key concerns. We ask that you please consider the attached revisions to chapters 3, 4, 5 and 7 as you continue your work to complete the Delta Plan.

Metropolitan is also participating in the coalition of statewide urban and agricultural interests that is developing an alternative Delta Plan, and we support the coalition letter submitted to you on June 10. The specific Delta Plan revisions we are proposing are intended to be consistent with the coalition approach for an alternative Delta Plan.

Overall, Metropolitan's proposed revisions to the Third Draft Plan seek to create a plan that draws on the expertise and outcomes of the agencies that have responsibilities in the Delta. The proposed revisions modify the description of the Council's role and authorities in water management, ecosystem restoration and Delta risk reduction to be consistent with existing law, and rephrase some of the policies more appropriately as recommendations to state agencies or the Legislature. Following is a summary highlighting Metropolitan's proposed revisions to the Draft Plan chapters.

- Revisions to Chapter 3 clarify the definition of covered action and the description of the process to certify consistency of covered actions with the Delta Plan.
- Revisions to Chapter 4 clarify the policies and recommendations addressing regional self reliance to emphasize recommendations to the appropriate agencies to develop policies and guidance for a new water sustainability element in the Urban Water Management Plan (or an equivalent plan). Other revisions properly place the discussion of Delta flow

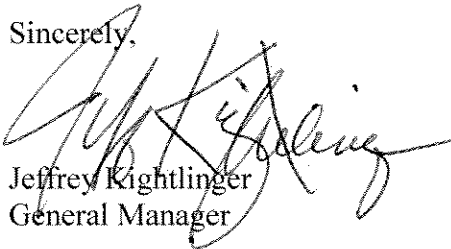
June 10, 2011

criteria as a recommendation to the State Water Resources Control Board and urge the State Water Board to consider the many other factors that impact the Delta.

- Revisions to Chapter 5 clarify the role of the Bay Delta Conservation Plan in achieving the co-equal goals.
- Revisions to Chapter 7 incorporate the essential actions necessary for the Council to meet the overarching and long-term economic or ecosystem sustainability goals required to meet the Council's responsibilities under the Delta Reform Act.

We urge you to consider these revisions to the Delta Plan. We believe these revisions are an essential step to creating a workable Delta Plan that provides an effective role for the Delta Stewardship Council to organize and encourage state and federal agency actions and decisions that are necessary to achieve the co-equal goals.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeff Kightlinger", is written over the typed name and title.

Jeffrey Kightlinger  
General Manager

Attachments

cc: Members of the Delta Stewardship Council  
Mr. Joseph Grindstaff

# Chapter 3

## Governance: Implementation of the Delta Plan

### Covered Actions Are a Core Responsibility

Central to the work of the Council is this Delta Plan. In contrast to plan implementation in most governmental contexts, the Council does not exercise direct review and approval authority over proposed actions for consistency with the Delta Plan. In most cases, the Delta Plan functions as a strategic plan in that it is a guidance and recommendation document. However, in some cases, actions taken by local or State agencies are “covered actions” as defined in Water Code section 85057.5. The State or local agency proposing to carry out, approve, or fund a “covered action” certifies the consistency of the covered action with the Delta Plan and files a certificate of consistency with the Council. A certificate of consistency may be appealed to the Council within 30 days, alleging that the proposed covered action is not consistent with the Delta Plan. Upon receiving such an appeal, the Council has 60 days to hear the appeal and an additional 60 days to make its decision and issue specific written findings. These indirect processes and tight time lines are unique among California state agencies. They will work most effectively if based on clear regulations, transparency, and energetic Council management of its agenda.

Only certain activities qualify as covered actions, and the Act establishes both criteria and exclusions. This Delta Plan further clarifies what is and is not a covered action. As an example, routine levee maintenance by a reclamation district in the Delta would not be a covered action because it is statutorily excluded. Also, an addition to a house in an incorporated city would likely not be a covered action because it would not appear to have a significant impact on the Delta. However, a new intake for water supply from the Delta, development of a subdivision in a Delta floodplain that does not meet exclusion criteria in the Act, or establishing a new tidal marsh area are likely to be covered actions.<sup>1</sup> The ultimate determination of whether or not a proposed project is a covered action rests with the proponent, the state or local agency. However, any determination that a proposed project is not a covered action under the Act may be challenged in court. While the Council does not make the decision whether a proposed project is a covered action, the Council is authorized and willing to work with the proponent to provide advice.

This Delta Plan incorporates and builds upon existing state policies where possible, with the intention of meeting the Act’s requirements without establishing an entirely new set of policies. For example, Delta Plan regulatory policies on reducing flood risk incorporate recent California legislation that requires upgrades to levees protecting urban areas.

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<sup>1</sup> There are specific exemptions for land in the Secondary Zone that are consistent with a sustainable communities strategy or where a notice of determination was filed by September 30, 2009. For a more detailed list see Water Code section 85057.5.

In other cases, Delta Plan regulatory policies seek to prevent actions that may preclude the future implementation of projects that meet the requirements of that Act, such as the acquisition of floodplain area for construction of a new bypass or restoration of certain lands uniquely suited to habitat. Similarly, the Delta Plan includes regulatory policies to protect floodplains and floodways until studies are completed by the Department of Water Resources.

The Act requires the Council to establish and oversee a committee of agencies responsible for implementing the Delta Plan. The statute directs each agency to coordinate its actions pursuant to the Delta Plan with the Council and other relevant agencies. The Council will commence regularly scheduled coordination meetings of the appropriate and interested agencies upon adoption of the Delta Plan. Council staff has met with federal agencies and is developing the Delta Plan in consultation with these agencies in order to pursue future consistency and compliance with the Coastal Zone Management Act, as required by Water Code section 85300(d)(1)(A).

## How Will the Regulatory Policies of the Delta Plan Work in Practice?

This section includes a discussion of the general requirements for certifying consistency with the Act and additional examples of covered actions. Delta Plan policies are not intended and shall not be construed as authorizing the Council or any entity acting pursuant to this section, to exercise their power in a manner which will take or damage private property for public use, without the payment of just compensation. This policy is not intended to affect the rights of any owner of property under the Constitution of the State of California or the United States. None of the Delta policies increase the State's flood liability.

## What Is the Definition of a “Covered Action”? Who Determines Whether a Proposed Plan, Program, or Project Is a “Covered Action”?

A “covered action” is defined in the Act as:

*“...a plan, program, or project as defined pursuant to Section 21065 of the Public Resources Code that meets all of the following conditions:*

- 1. Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;*
- 2. Will be carried out, approved, or funded by the state or a local public agency;*
- 3. Is covered by one or more provisions of the Delta Plan;*
- 4. Will have a significant impact on the achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta.” (Water Code section 85057.5(a))*

The first step in determining a “covered action” is to identify whether the proposed plan, program, or project meets the definition in Public Resources Code section 21065. That particular provision is the section of the California Environmental Quality Act that defines the term “project” for purposes of potential review under the California Environmental Quality Act (CEQA). ~~It is important to note, however, that CEQA’s contains various statutory and categorical exemptions—which are considered for possible application in a CEQA analysis only after the threshold determination of a CEQA that exempt an action that otherwise would meet the basic definition of a “project.” is made—are not~~

~~similarly incorporated by cross-reference in the definition of “covered action.”~~ Thus, for example, while ~~one section of a proposed action might meet the basic definition,~~ CEQA provides that its terms do not apply to “ministerial projects” (see Public Resources Code sec. 21080(b)(1)); if a proposed action that in the first analysis would be a project under CEQA and thus a covered action under the Act, fits the “ministerial” exemption, those types of projects do it would not fall under the CEQA or the Act’s definition of “covered action.”

The next step in determining a covered action is to review the four additional conditions in the definition of “covered action,” all of which must be met by a proposed plan, program, or project, even if it meets the CEQA definition of a “project.”

In order to qualify as a covered action, the action must occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh. It must be carried out, approved, or funded by the state or a local public agency.

A proposed plan, program, or project must be covered by one or more provisions of the Delta Plan, ~~meaning that a regulatory policy is applicable to the proposed action.~~ The Delta Plan may exclude specified actions; therefore, those actions would not be covered by one or more provisions of the Delta Plan.

In addition, a proposed plan, program, or project must have a “significant impact on achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta” under Water Code section 85057.5(a)(4). For this purpose, the Council has determined that “significant impact” means a substantial or potentially substantial change in existing conditions that is directly, or indirectly, ~~and/or cumulatively~~ caused by a project and that will ~~or may affect~~ significantly impact the achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and State interests in the Delta.

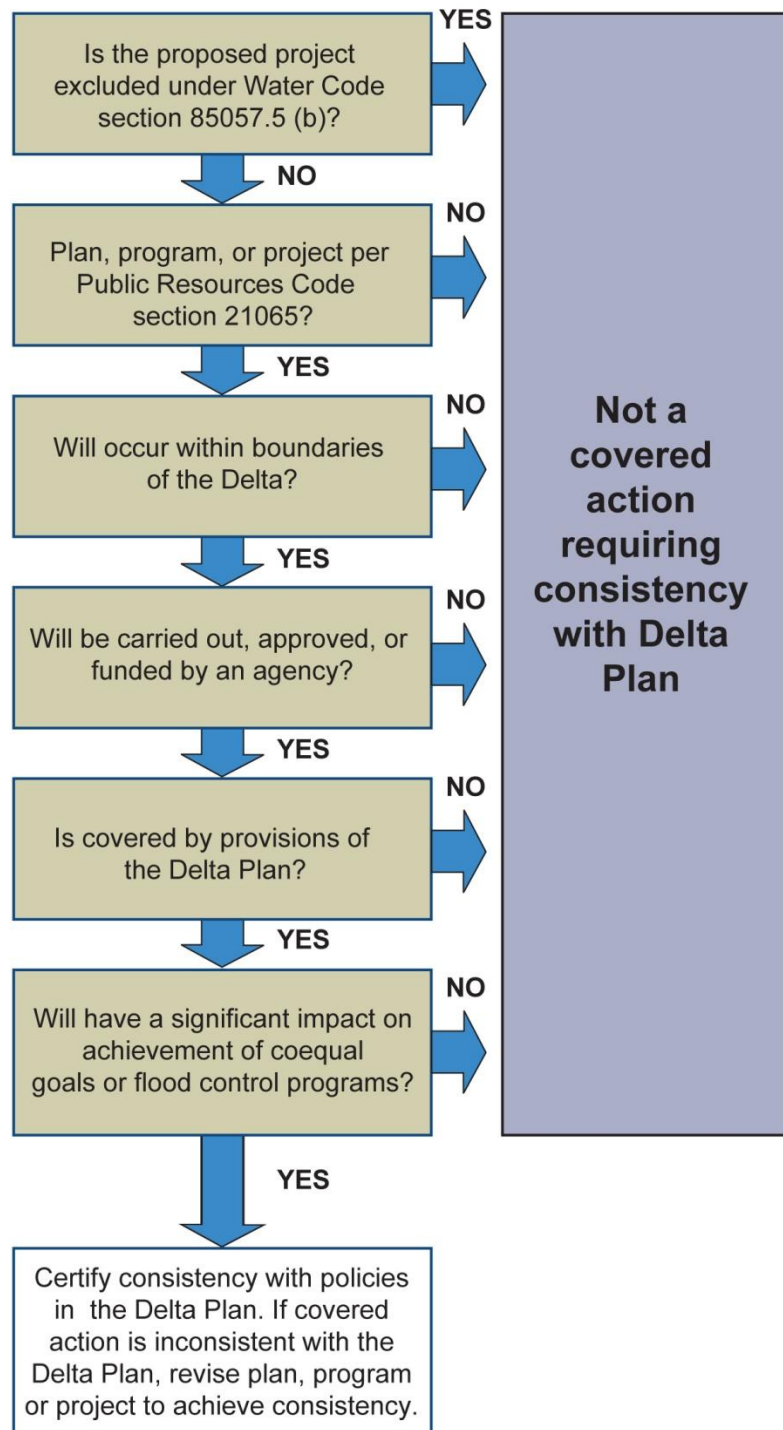
Certain actions are statutorily excluded by the Act from the definition of “covered action,” for example:

- ϕ a regulatory action of a state agency (such as the adoption of a water quality control plan by the State Water Resources Control Board, or the issuance of a California Endangered Species Act permit by the Department of Fish and Game),
- ϕ routine maintenance and operation of the State Water Project or the federal Central Valley Project, and
- ϕ routine maintenance of levees by a reclamation district (Water Code section 85057(b)).

As specified in Paragraph 2 of the Council’s Administrative Procedures Governing Appeals (Appendix A), if requested, the Council’s staff will meet with an agency’s staff during “early consultation” to review the consistency of a proposed action and to make recommendations. The agency’s staff may also seek clarification of whether a proposed project is a “covered action,” provided that the ultimate determination on whether it is a covered action shall be made by the agency, subject to judicial review.

Figure 3.1 shows the steps in identifying a covered action. Agencies retain flexibility in how to meet these responsibilities for covered actions within the parameters of other legal authorities.

**Figure 3.1**  
**Decision Tree for State and Local Agencies on Possible Covered Actions**



WBG01281114346SAC Figure\_3-1.ai

## Certifications of Consistency

State or local agencies that propose to undertake “covered actions” are required to certify with the Council, prior to initiating implementation, that these proposed plans, programs, or projects are consistent with the Delta Plan (Water Code section 85225 et seq.). The Council will develop a check list which agencies may use to facilitate the process. Additionally, as required in statute, an agency that proposes to undertake a covered action must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with the Delta Plan (Water Code section 85225). These findings must be submitted to the Council as part of the certification of consistency. Any person may appeal the certification of consistency and, if a valid appeal is filed, the Council is responsible for subsequent evaluation and determination—as provided in statute and the Council’s Administrative Procedures Governing Appeals—of whether the proposed covered action is consistent with the Delta Plan’s ~~regulatory policies~~. More than one ~~provision regulatory policy~~ in the Delta Plan may apply to a covered action.

If the Council determines on appeal that a covered action is not consistent with the Delta Plan it will remand the proposed action to the state or local public agency. The state or local public agency may decide to proceed with the covered action as proposed, or as modified to respond to the Council’s findings, despite a Council determination that it is not consistent with the Delta Plan. However, prior to proceeding the state or local public agency must file a revised certification that addresses each of the findings made by the Council. (Water Code Section 85225.5) While the state or local public agency may choose to proceed with a covered action even though the Council has determined it is not consistent with the Delta Plan, the determination of the Council will likely be a consideration in obtaining regulatory approvals for the action.

A covered action must not only be consistent with the Delta Plan at time of certification, but to ~~remain be~~ it must also be implemented as described in its finding of consistency.

Certifications for consistency must demonstrate that a covered action is consistent with the Delta Plan by being fully transparent, disclosing potential impacts, demonstrating legal authority and that the action can be implemented as described in its finding of consistency~~sufficient capacity~~, complying with all relevant laws, and identifying how best available science will be used in decision-making and adaptive management.

The Act contains multiple references to the use of best available science, including specific requirements such as, for example, that ongoing ecosystem restoration or water management decisions include a science-based, transparent, and formal adaptive management strategy (Water Code section 85308(f)). Best available science involves not only the use of sound information but is a process that meets the criteria of (1) relevance, (2) inclusiveness, (3) objectivity, (4) transparency and openness, (5) timeliness, and (6) peer review (National Research Council 2004). Best available science is consistent with the scientific process (Sullivan et al. 2006). Best available science is specific to a decision context and would necessarily be related to the specific decision to be made and the time frame available for that decision. For science to be considered “best available” to support a decision, reasonable care must be taken to identify all available and relevant scientific information. Sources for best available science may include peer-reviewed publications, general scientific reports and publications, scientific expert opinion, or even anecdotal evidence. See Chapter 2 for a more detailed discussion of best available science. Table 2-1 establishes the priority for the value placed on each information source.

## Policy

G P1 Certifications for consistency with the Delta Plan must address the following:



All covered actions must be fully transparent by disclosing all potentially significant adverse environmental impacts and mitigations of those adverse impacts.

All covered actions must be based on best available science. **[COUNCIL TO DISCUSS FURTHER]**

All covered actions must ~~describe the demonstrate~~ managerial and financial capacity to implement the covered action over the long term. ~~Managerial capacity includes ownership and water rights relevant to the covered action. Financial capacity includes budgeting, capital improvement planning, and a financing plan relevant to the covered action.~~

All covered actions must identify and comply with existing relevant law, including water quality regulations and water rights.

Large-scale ecosystem restoration and water management covered actions must describe the process that will include adequate provisions to assure provide continued implementation of adaptive management consistent with the Delta Plan.

~~—This requirement shall be satisfied through:~~

- ~~⊕ an adaptive management strategy consistent with the adaptive management framework of Chapter 2;~~
- ~~⊕ documentation of how the proposed covered action will achieve its desired result;~~
- ~~⊕ performance measures and targets relevant to meeting the Delta Plan's objectives enumerated in Section 85302(c), Section 85302(d), and Section 85302(e);~~
- ~~⊕ monitoring and analyses requirements sufficient to make adaptive management decisions and to capture any effects that may help or hinder achieving the coequal goals as expressed in the Act or the Delta Plan;~~
- ~~⊕ documentation of delineated authority by the agency responsible for the covered action to support the implementation of the full adaptive management process, including planning, implementation, monitoring, data management, analyses, obtaining the best available science, communicating results, supporting decision making, and full implementation of any changes in implementation of the covered action; and~~
- ~~⊕ procedures ensuring public release of all information developed related to adaptive management, including, but not limited to, primary data, modeling, analyses, and syntheses of research findings.~~

## Changing the Delta Plan

### Incorporation of Another Plan into the Delta Plan

The Council may incorporate another plan, in whole or in part, into the Delta Plan. When fully incorporated, these elements of another plan become the basis for consistency determinations and relevant to the actions of State and local agencies. The agency which has the original plan authority will continue to take actions under that authority.



## Incorporation of the Bay Delta Conservation Plan into the Delta Plan

The Bay Delta Conservation Plan is a major project considering large-scale improvements in water conveyance and large-scale ecosystem restorations in the Delta. When completed, it must be incorporated into the Delta Plan if it meets ~~specified~~ conditions [specified in the Act](#). Completion of the Bay Delta Conservation Plan process and the full suite of projects now under consideration in that process would have large impacts on the Delta and would affect the coequal goals. ~~However, completion and full implementation of the Bay Delta Conservation Plan is not equivalent to satisfying the Act.~~

## Transparency and Communications Plan to Implement the Delta Plan

The Council is committed to transparency and effective participation in its processes. To that end, the Council requires full transparency in information provided to it and timely public posting of information relevant to its actions. It will post all communications received.

The Council also seeks strong working relationships with agencies and stakeholders. Important components of those effective working relationships are procedures that ensure transparency and robust procedures for early consultation that are used consistently.

Decisions of the Council will be posted on its website. A public list of policies and plans determined to be consistent and not consistent with the Act shall be maintained on the Council website and included in reports of the Council on its effectiveness in implementing the Act.

Where required by law or as it deems feasible and appropriate, the Council will provide findings for its actions, which shall be posted publicly.

Information developed by the Council or provided to the Council shall be publicly accessible on the Council's website.

## References

- National Research Council, Committee on Defining the Best Scientific Information Available for Fisheries Management. 2004. Improving the use of "Best Scientific Information Available" Standard in Fisheries Management. National Academy Press, Washington D.C. Available from [http://www.nap.edu/catalog.php?record\\_id=11045#toc](http://www.nap.edu/catalog.php?record_id=11045#toc) (accessed July 2010).
- Sullivan, P. J., J. M. Acheson, P. L. Angermeier, T. Faast, J. Flemma, C. M. Jones, E. E. Knudsen, T. J. Minello, D. H. Secor, R. Wunderlich, and B. A. Zanetell. 2006. Defining and implementing best available science for fisheries and environmental science, policy, and management. American Fisheries Society, Bethesda, Maryland, and Estuarine Research Federation, Port Republic, Maryland. Available from [http://www.fisheries.org/afs/docs/policy\\_science.pdf](http://www.fisheries.org/afs/docs/policy_science.pdf) (accessed July 2010).



# Chapter 4

## A More Reliable Water Supply for California

California has outstripped the capacity for its existing infrastructure to satisfy the economic, environmental, and social demands for water (Hanak et. al. 2011). The state uses more groundwater than nature replenishes (Department of Water Resources 2009). Since 1914, the State Water Resources Control Board has issued permits for the diversion [and use](#) of water from the Delta [and its watershed](#), but total actual diversion [and use](#) amounts are currently unknown [in many areas of the state](#) and may be unsustainably over-allocated (State Water Resources Control Board 2008b). [In addition, there is evidence that a significant amount of water diverted and used within the Delta that is not based on, or is in excess of, any demonstrable water right. Enforcement to prevent these illegal diversions has been virtually non-existent, resulting in the reduction in the amount of water available to legal diverters and to instream flow needs.](#) Conflicts over California's water supplies have reached a point where the Legislature has found "the Sacramento-San Joaquin Delta watershed and California's water infrastructure are in crisis and existing Delta policies are not sustainable" (Water Code section 85000).

Variability of water availability is perhaps one of the most dominant characteristics of the state's water supply system. Most of the state's water originates as precipitation that falls during winter months, with about two-thirds of the available runoff coming from the mountains in northern California (Hanak 2011). California has developed a complex and interconnected system of surface reservoirs, aqueducts, and water diversion facilities that store and convey water from areas that have water available for use to urban and agricultural areas that have water needs. These systems were designed during the mid 20th century with minimal consideration of the harm that these water diversions could cause to the environment and native fisheries. As a result, [development and use of the water supply system is one of the many factors that have contributed to the decline in](#) California's native Delta ecosystem ~~is in decline~~.

One of the Delta Reform Act's key objectives is "to provide a more reliable water supply for the state" (Water Code section 29702). Therefore, the Delta Plan focuses on policies and recommendations that will increase the reliability of water supplies in the state that are available to meet demands while, at the same time, reducing local and regional reliance on Delta exports [for their future water supply needs](#) (Water Code section 85021). A responsible plan to improve water supply reliability in the state must address the problem on all fronts: [continue to reduce per capita](#) ~~control~~ water demand and improve conservation; deal with infrastructure limitations on storage and conveyance; [through smarter approaches to water supply operations and regulation, habitat improvement and other actions, restore the ability to divert and use supplies lost to environmental regulation while more effectively protecting and restoring environmental values](#) ~~ensure that water flow standards to protect and restore the Delta ecosystem are updated and enforced~~; and develop additional local and regional water supplies through improved groundwater management, water reuse, groundwater treatment, stormwater capture and recharge, and desalination. Ultimately, ~~water supply~~ reliability [of future water supply needs](#) for the state [largely](#) will be achieved at

the regional level through a combination of sustainable water management, regional self-reliance and water balance, and improved conveyance and storage.

## Policies and Recommendations

### Improve Regional Water Self-Reliance

Since the early 1980s, California has recognized the importance to the state of improving regional water supply self-reliance through conservation and the increased development of local and regional water supplies. These programs and projects increase the reliability of the state's water supplies by lowering ~~controlling~~ overall demand for the state's ~~limited~~ water resources and providing a diverse array of water supplies that often are more resilient under drought, emergency shortage, and climate change conditions.

All regions were originally established with available local supplies. As regions grew, some areas turned to importing water supplies to accommodate anticipated growth. Now as conflict increases on imported supplies, there is a need to enhance local and regional water supply development ~~often makes water available~~ from sources that ~~historically~~ have been unrecognized, underutilized, or unavailable. Decreased reliability of imported supplies, technological advances, and regional collaboration and innovation has made this possible. Recycled water provides an opportunity to use the same water several times before it reaches the ocean.<sup>2</sup> With additional treatment, groundwater that has been rendered non-potable by natural or human introduction of contaminants can be transformed into a drinking water supply. Similarly, desalination allows saline water to be used for drinking water. Stormwater that previously has been channelized to limit flooding and sent to the ocean can be recaptured and used for groundwater recharge (City of Los Angeles, UWMP 2010). Improved local storage, both surface and groundwater, increases the flexible management of water supplies statewide, especially through local conjunctive management programs (Hanak et al. 2011). Even retail and wholesale water rate structures can play a ~~critical~~ role in ensuring that residential and business customers and agricultural users understand the value of the water they use and do their part to conserve the state's water resources. While improvements to statewide water infrastructure remain critically important to long term water supply reliability, California has a wealth of local water resources that can be developed to improve regional self reliance and help achieve the coequal goals in the near term.

ADDITIONAL INFORMATION TO BE PROVIDED ON REGIONAL SELF-SUFFICIENCY USING EXAMPLES FROM APRIL WORKSHOP AND OTHERS WHO HAVE ALREADY EFFECTIVELY INCORPORATED A WATER SUSTAINABILITY /REDUCED DELTA DEPENDENCY ELEMENT IN THEIR URBAN AND AGRICULTURAL WATER MANAGEMENT PLANS/IRWMPs

The State has promoted local and regional water supply planning by requiring local agencies to develop plans, such as Urban Water Management Plans and Agricultural Water Management Plans, that forecast sources of supply and the actions needed (including demand management) to ensure that future demands are met over the next 25 years.<sup>3</sup> Since 2000, the State has also promoted voluntary integrated regional water management planning, recognizing that collaboration among the agencies within a watershed provides opportunities for better water management decisions and coordinated infrastructure

<sup>2</sup> DWR, 2009: Value of water recycling in stretching local water supplies by increasing the number of times that water is used and reused before it reaches the ocean.

<sup>3</sup> Requirement as a condition to receive state funding for water infrastructure from grant and loan programs administered by the state.

investments.<sup>4</sup> Over \$2 billion in State bond funds have been made available to support implementation of projects identified in these plans.

Overall, statewide progress in increasing local and regional water supplies is being made. As of 2011, the Department of Water Resources reported that over 90 percent of the state's population was covered by locally approved integrated regional water management plans. The 2009 California Water Plan indicates that statewide water use efficiency has improved, water recycling is expanding, and other local and regional water supplies are increasing. Most notable are the outstanding water management successes of major population areas, such as the City of Los Angeles, where future new water demands are now projected to be met only through increased conservation and local water supplies (Hanak et al. 2011).

With the enactment of the Delta Reform Act of 2009, it is now the policy of California to reduce reliance on the Delta in meeting future water supply needs [through investment in improved regional water supplies, conservation, and water use efficiency](#) (Water Code section 85021). The Act requires that "each region that depends on water from the Delta watershed shall improve regional self-reliance for water through investment in water use efficiency, water recycling, advanced water technologies, local and regional water supply projects and improved regional coordination of local and regional water supply efforts" (Water Code Section 85021).

However, while voluntary planning and reporting on conservation and water supply projects may occur in a regional context, the decisions to fund and implement these projects remain under the control of individual water agencies. To promote statewide sustainable water use and ensure compliance with the Delta Reform Act, water agencies need to identify their actions and investments to implement conservation and water supply projects and explain how these projects are contributing to regional self-reliance and reduced reliance on the Delta. The state's progress in meeting its regional self-reliance goals should be summarized in future California Water Plan updates.

## ***Problem Statement***

Additional local and regional conservation and water supply development is needed to improve regional self-reliance in order to reduce reliance on the Delta [for future water supply needs](#) and achieve the coequal goals.

## ***PoliciesRecommendations***

~~The following policies (WR P1, WR P2, and WR P3) only apply as regulatory policies as follows:~~

- ~~A. A covered action involving the export of water out of the Delta, or involving the transfer of water through the Delta, is inconsistent with the Delta Plan if the need for that covered action is significantly caused by a recipient region's failure to comply with policies WR P1, WR P2, and/or WR P3.~~
- ~~B. A covered action involving the use of water in part or in whole in the Delta is inconsistent with the Delta Plan if the need for that covered action is significantly caused by the water using region's failure to comply with policies WR P1, WR P2, and/or WR P3.~~

~~In all other situations, WR P1, WR P2, and WR P3 are recommendations.~~

WR RP1 To promote statewide accountability in achieving the coequal goals, [the Council recommends that the Legislature and Governor enact legislation requiring](#) water suppliers that deliver water

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<sup>4</sup> An Integrated Regional Water Management Plan must be approved by the Department of Water Resources to receive bond funding for implementation of identified projects.

diverted or exported from the Delta or the Delta watershed ~~to shall~~, by December 31, 2015, include a new Water Sustainability Element in their Urban Water Management Plan and/or Agricultural Water Management Plan (or an equivalent plan). The Water Sustainability Element shall detail how water suppliers are improving regional self-reliance and reducing dependence on the Delta through investments in local and regional programs and projects. At a minimum, the Water Sustainability Element shall include:

**A Plan for Possible Interruption of Delta Water Supply:** Identify how reliable water service will be provided for a minimum period of at least six months in the event the Delta's export operations are interrupted during an average water year, dry water year, and following three dry water years.

**Evaluation of Planned Investments in Water Conservation and Water Supply**

**Development:** Identify specific programs and projects that will be implemented over the twenty year planning period and how they contribute to the improvement of regional self-reliance and reduced dependence on the Delta, including:

- ☐ Water Conservation and Water Use Efficiency
- ☐ Local Groundwater and Surface Storage
- ☐ Conjunctive Use Programs
- ☐ Water Recycling
- ☐ Use of Currently Non-Potable Groundwater
- ☐ Storm Water Capture and Recharge
- ☐ Saline Water and Brackish Water Desalination

- φ **Evaluation of Regional Water Balance:** Provide an assessment of the long term sustainability of water supplies to meet projected demands within the supplier's hydrologic region, as defined by in the 2009 California Water Plan Update, over the twenty year planning period. If the region lacks balance, indicate the steps that are being taken through the Integrated Regional Water Management Plan to bring the region into balance. If the region is not in balance and its Integrated Regional Water Management Plan is not available or does not identify the steps being taken to bring the region into long-term balance, then describe how the supplier's programs and projects are helping to bring the region into balance.

- φ **Sustainable Water Rate Structure:** ~~Evaluate~~Describe the degree to which the supplier's current rate structure ~~either sustainably encourages and supports~~ or reflects the cost of supplying the resource.

**ADDITIONAL OPTIONS FOR COUNCIL CONSIDERATION:**

Recommend that the Legislature and Governor enact a requirement that ~~Require the addition of~~ a Water Sustainability Element must be included in Integrated Regional Water Management Plans. The element should includes an assessment of the long term sustainability of water supplies to meet projected demands and, if the region is out of balance, a requirement for the implementation of local and regional programs and projects that will achieve regional water balance within the twenty year planning horizon. ~~To be consistent with the Delta Plan, The legislation could require~~ would to be required to be part of a Department of Water Resources-approved Integrated Regional Water Management Plan with a Water Sustainability Element the meets the regional water balance criteria.

~~Convert regulatory policy stated above into a recommendation.~~ Provide recognition/incentive to water suppliers that have achieved regional water balance or have demonstrated long-term

improvement in regional self-reliance and reduced dependence on the Delta. Recommend that state agencies which administer state grants or loans to fund water projects or programs include in their funding criteria a priority for Integrated Regional Water Management Plans (or individual water suppliers) that can demonstrate through their adopted Water Sustainability Element that they have achieved Regional Water Balance (or that, as a water supplier, they have improved regional self-reliance and reduced their dependence on Delta diversions).

WR ~~PR~~2 Water suppliers that deliver water diverted or exported from the Delta or the Delta watershed ~~should shall, at a minimum,~~ meet the standards and timelines established in Water Code section 10608 et seq. and section 10800 for urban and agricultural water use efficiency.<sup>5</sup> Recommend that state agencies that administer state grants or loans to fund water projects or programs include in their funding criteria a priority for water suppliers that meet the standards in Water Code sections 10608 et seq. and 10800.

WR ~~PR~~3 Retail water suppliers that deliver water diverted or exported from the Delta or the Delta watershed ~~shall should,~~ by December 31, 2020, develop and implement a rate structure that ~~sustainably encourages and supports water conservation which may include the adoption of a water budget-based rate structure~~ is consistent with the California Urban Water Conservation Council's Best Management Practice for retail conservation pricing as shown in Exhibit 1 of the "Memorandum of Understanding Regarding Urban Water Conservation in California", to the extent allowed by regulation. Recommend that state agencies that administer state grants or loans to fund water projects or programs include in their funding criteria a priority for water suppliers that have implemented rate structures that sustainably encourage and support water conservation.

## **Recommendations**

WR R~~4~~ If the legislation recommended in WR R1 is enacted, The California Department of Water Resources, in consultation with the Council, the State Water Resources Control Board and others, should develop and approve, beginning one year after enactment by December 31, 2014, Urban Water Management Plan and Agricultural Water Management Plan guidelines for a Water Sustainability Element, based on the criteria contained in WR ~~PR~~1.

WR R~~5~~ If the legislation recommended in WR R1 is enacted, Bbeginning one year after enactment in 2016, State agencies should prioritize state funding for water agencies in the state that have a complete Water Sustainability Element in their adopted Urban Water Management Plans and/or Agricultural Water Management Plans and or Integrated Regional Water Management Plans.

WR R~~6~~3 A proponent for a new proposed point of delivery ~~from the State Water Project~~ that results in increased demand for diversions from or use in the Delta or the Delta Watershed should demonstrate that the project proponents have evaluated and implemented all other feasible water supply alternatives.

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<sup>5</sup> SB X7-7, also known as the 20% by 2020 legislation, was enacted in 2009. For urban water suppliers, the law requires the state to achieve a 20% reduction in urban per capita water use by December 31, 2020, with incremental progress measured by a 10% reduction by December 31, 2015. Agricultural water suppliers are required to measure the volume of water delivered to customers, adopt a pricing structure based at least on quantity delivered and implement additional conservation measures that are locally cost effective and technically feasible by July 31, 2012. A report on efficient water management practices is required to be included in the supplier's agricultural management plan. In addition, the act requires agricultural management plans to be completed by December 31, 2012, with an update by December 15, 2015, and every five years thereafter. Urban and agricultural water suppliers are ineligible for state water grants or loans unless they are in compliance with the act.



## **Program to Improve Conditions in the Delta and Address Other Stressors to Provide a More Reliable Water Supply**

Over the last two decades the State Water Project and Central Valley Project have lost significant water supply reliability due to environmental regulation. At least to some extent, these losses have been incurred due to the use of flow as a surrogate to mitigate negative impacts not caused by project operations, but by habitat degradation and other stressors. Smarter approaches to water project regulation and flow requirements based on better science that actually focus on cause/effect relationships should be developed and implemented. Just as importantly, habitat improvements and implementation of programs to address the numerous other stressors impacting the Delta will mitigate for their direct impacts on the Delta ecosystem. Chapter 5 describes the habitat degradation and negative impacts of other stressors and provides a number of policies and recommendations to cure that degradation and those impacts. Implementation of those measures will directly address these underlying factors causing or contributing to degradation of the Delta and its resources and will reduce that portion of the regulatory burden that has been imposed on the export projects to mitigate for these other factors. Implementation of the restoration actions included in Chapter 5 will enable the projects to restore a measure of the supply reliability that has been lost and contribute to meeting the goal of providing a more reliable water supply.

## **Delta Instream Flow Criteria and the Setting of Flows**

Long-standing California law has granted to the State Water Resources Control Board considerable authority in the areas of water rights, water quality protection, and the setting of instream water flow criteria. In addition, the State Water Resources Control Board has the authority to enforce the Public Trust Doctrine and the provisions of the California Constitution, in Article X, Section 2, which pertain to the reasonable and beneficial use of water resources of the state to the fullest extent of which they are capable in the public interest.

Unfortunately, as California's water supply has tightened—as the demands for water have increased and the sources of supply become more volatile—the State Water Resources Control Board has been at the center of political disputes over how its decisions on water allocations should be made. Often, the decisions needed to protect the State's interests in ecosystem protection and water supply reliability have been blocked by battles among competing interests, by inadequacies in the science supporting proposed actions or by recent degraded conditions in the Delta and inadequate infrastructure. In addition, many major factors, most of which are not within the State Water Resources Control Board's authority, have degraded the environment of the Delta and its watershed and caused significant reductions in water supply for human uses. The resulting situation downward spiral in which the state now finds itself, with native fish populations crashing and reduced reliability of water exports from the Delta, is unsustainable.

If the coequal goals are to be achieved, it is essential that the State Water Resources Control Board expeditiously carry out its responsibility to complete the work to set flow-reasonable water quality objectives and flow criteria for the Delta and the major tributary streams in the Delta watershed. In doing so, the State Water Resources Control Board must identify the other factors impacting the Delta and its watershed, including recommendations for appropriate action by entities with authority over those other factors (Water Code section 13242). The state cannot afford further delay. It is impossible for the state to plan and build a reliable water system where future ecosystem flow requirements are not known. This is true everywhere in the State but especially true in the Delta. Water suppliers cannot commit to funding new projects and making effective decisions about billions of dollars of infrastructure investments until the State Water Resources Control Board process is complete. Until the flow issue is resolved, every action that potentially increases the amount of water diverted from or moved through the Delta is vulnerable to legal challenge over the question of whether there are sufficient flows to protect and restore the environment.

The State Water Resources Control Board is in the midst of a phased process to review and amend—or to adopt new—[flow water quality objectives and flow requirements](#) for the Delta and its high priority tributary streams. The State Water Resources Control Board has set a work plan and schedule for developing flow standards for the Delta and its watershed. The first step was taken in 2010, when the State Water Resources Control Board completed its report on the *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* (State Water Resources Control Board 2010a). This study provides an assessment of the flows needed to protect the Delta and its ecological resources and does not include other public trust considerations, [or consider the reasonableness of the criteria when balanced against the public interest in the consumptive needs for water, probable future supply needs, economic considerations and control of other factors.](#) (See Water Code sections 13000 and 13241). [The Legislature, in directing the State Water Resources Control Board to take this narrow focus, explicitly recognized the limitations of the flow criteria report by limiting its use to planning \(rather than regulatory\) purposes and providing that the criteria were not to be predecisional. \(Water Code section 85086\(c\)\(1\) While only the starting point for the broader flow standard setting process.](#) However, the report underscores the importance to California of resolving, [as soon as possible, what the appropriate those future flow regimes need to be in the larger context of control of the other factors impacting the Delta and its watershed and the other actions that will be taken as part of the Delta Plan.](#)

Currently, the State Water Resources Control Board is in the process of addressing San Joaquin River flows and expects to complete the first phase of this process by June 2012. The State Water Resources Control Board is coordinating with the Department of Water Resources in its preparation of the Bay Delta Conservation Plan and may consider environmental documentation developed for the Plan in its proceedings. In December 2010, the State Water Resources Control Board completed a prioritized schedule and estimate of costs to complete the instream flow studies for the Delta, in accordance with Water Code Section 85087 (State Water Resources Control Board 2010b).

## **Problem Statement**

The State Water Resources Control Board needs to [review and update Delta water flow requirements as appropriate standards.](#)

## **Policies Recommendations**

WR ~~R7~~P4 The State Water Resources Control Board should [continue to expeditiously complete review of water quality objectives and Delta flow requirements and take steps to implement any revised objectives and flow requirements through water rights proceedings consistent with its “Strategic Workplan for Activities in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary” adopted July 2008. This review should include the flow studies required for high priority rivers and streams in the Delta Watershed, San Joaquin River and its tributaries by Water Code section 85087 by no later than the dates proscribed in that section and the SWRCB’s current consideration of amendments to the San Joaquin River flow objectives. develop flow criteria and establish flows as follows:](#)

WR R8 The State Water Resources Control Board’s program of implementation for water quality objectives and flow requirements should address the control of other factors impacting the Delta and its watershed as necessary to achieve the objectives, including recommendations for appropriate action to other agencies (Water Code section 13241).

- ~~ϕ By June 2, 2014, adopt and implement flow objectives for the Delta that are necessary to achieve the coequal goals.~~
- ~~ϕ By June 2, 2018, develop flow criteria and establish flows for high priority tributaries in the Delta watershed that are necessary to achieve the coequal goals.~~

- ~~φ Prior to the dates indicated in (a) and (b), existing Delta flow objectives shall be used to determine consistency with the Delta Plan. If the State Water Resources Control Board fails to act by the dates indicated, the Council will XXX.~~

**~~OPTIONS FOR COUNCIL CONSIDERATION FOR CONSEQUENCES IF FLOWS NOT ADOPTED:~~**

- ~~— The Council could use the flow criteria identified by the State Water Resources Control Board from its report on the *Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem* (2010) to determine consistency of covered actions with the Delta Plan.~~
- ~~— Determine that a covered action that would increase the capacity of any water system to store, divert, move, or export water from the Delta and/or the Delta Watershed would not be consistent with the Delta Plan until the revised flow objectives are implemented.~~
- ~~Recommend that the Board cease issuing water rights permits in the Delta and the Delta watershed (or, if the absence of flow criteria is specific to one or more of the major tributaries, then the constraint could be focused to the impacted areas).~~

## Statewide Storage and Conveyance

California's water storage and conveyance system was designed to capture, transport, and deliver water to urban and agricultural end users. This infrastructure was not originally designed to protect ecosystem values and, in its current configuration, is not sufficiently flexible to meet the coequal goals of ecosystem protection and improvements to the state's water supply reliability (Hanak et al. 2011).

Conveyance capacity does not match water storage. During the key times when storage space is available, or there is current demand for water, water often cannot be pumped because the current Delta conveyance system impacts one or more listed species. This issue is being addressed through the Bay Delta Conservation Plan, but improvements in storage and conveyance will be needed while the Bay Delta Conservation Plan is being developed.

Today, the amount of storage capacity is inadequate, especially south of the Delta, to permit water users to take water at times when there is water in the Delta that can be diverted (Hanak et al. 2011). For example, in the spring of 2011, the south Delta pumps were turned off since urban and agricultural water users' needs were met by other water supplies, and storage locations south of the Delta could not take the available water. Looking ahead, these infrastructure challenges will be compounded by the predicted impacts of climate warming on the state's water supplies, as precipitation and runoff patterns shift and sea level rise increases the vulnerability of the Delta to floods. The State Water Project, which owns and operates the lowest elevation dams in the state's water system and controls the Delta intakes for the state system, is particularly vulnerable to these changes (Knowles and Cayan 2002).

In the past decade, the Department of Water Resources has expended tens of millions of dollars on integrated storage investigations to evaluate how surface storage and conveyance may be improved. These studies have confirmed the need for expanded infrastructure; however, as yet, there is no consensus on which storage or conveyance projects the state should select. Even when a decision is made, many of the proposals being studied, especially for the large dam sites, have substantial environmental, political, and financial challenges that may delay or even preclude their construction.

The state must be prepared for the possibility that it could take many more years for the state to select, build, and operate large-scale storage and conveyance improvement projects. As an interim step toward increasing the state's water supply reliability, the state should consider smaller, more incremental operational and storage improvements at existing facilities that can be accomplished within the next 5 to

10 years. In addition, the state needs to consider how groundwater storage and especially conjunctive management programs (in combination with conservation, local water supplies such as stormwater capture and recycled water, and water transfer programs) may significantly enhance the operational flexibility of the state's system and improve the state's water supply reliability.

### **Problem Statement**

Improvements in conveyance and storage are needed to provide more operational flexibility.

### **Policies**

At this time, there are no policies with regulatory effect included in this section.

### **Recommendations**

WR R<sup>94</sup> The California Water Commission should hold hearings to identify and evaluate how large-scale storage and incremental improvements to surface and groundwater storage infrastructure and operations may be made in the Delta watershed and in areas that use water from the Delta over the next five to ten years to help achieve the coequal goals.

## **Reporting, ~~and~~ Transparency and Enforcement**

Despite the importance of improving water supply reliability to the state and its economy, California does not have complete ~~has limited~~ information on which to base sound water management decisions. ~~Due to the lack of standardized monitoring and reporting requirements, the state does not know how much water is available or used annually.~~ Since 1914, the State Water Resources Control Board has issued permits for the diversion and use of water from the Delta and in its watershed, but due to the lack of standardized monitoring and reporting requirements, how much water is available and total actual diversion amounts are currently unknown in many areas of the state and may be unsustainably over-allocated (State Water Resources Control Board 2008b). In addition, there is evidence that a significant amount of water diverted and used within the Delta that is not based on, or is in excess of, any demonstrable water right. Enforcement to prevent these illegal diversions has been virtually non-existent, resulting in the reduction in the amount of water available to legal diverters and to instream flow needs. In other regions of the state, water is pumped more quickly out of the ground than it is replenished (Department of Water Resources 2009).<sup>6</sup> Chronic groundwater overdraft statewide—essentially groundwater mining—has been estimated by the Department of Water Resources to be as high as 2 million acre-feet on a yearly average; however, recent satellite measurements of groundwater elevations within the Central Valley alone suggest that the overdraft in the last 7 years has resulted in the loss of 16.5 million acre-feet of groundwater storage (Famiglietti et al. 2011).

In recent years, the state has made a significant effort to quantify and report water use estimates by sector as well as by major hydrologic regions of the state through the California Water Plan (Department of Water Resources 2009). However, much of the water data that is available to the state from local, regional, state, and federal agencies and organizations is collected by these entities using differing methodologies and levels of detail (Hanak et al. 2011). Some data is reported on only a voluntary basis, such as the submission of annual data on regional groundwater elevations to the Department of Water Resources or the submittal of water conservation data to the California Urban Water Conservation Council, which, in 2008, was done by only 225 of the largest urban water suppliers (about half of agencies that could report). But even mandatory sources of local and regional water supply and use data, such as the Urban Water Management Plans that urban retail and wholesale water agencies (serving more than 3,000 customers) are required to update and submit to the Department of Water Resources every

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<sup>6</sup> Chapter 8 Conjunctive management and Groundwater Storage, Vol 2, Resource Management Strategies

5 years, do not use standardized data collection formats nor are they compiled electronically in a central data base. The information from these plans is important, but it is difficult to aggregate on a similar basis ~~inaccessible and as a result virtually useless~~ for the purpose of evaluating statewide water conservation and local water supply development trends that will contribute to the improvement of the state's overall water supply reliability.

~~Another important potential source of information about the state's water supplies are the contracts and transfer agreements involving water from the State Water Project. These documents are not developed through an open and transparent public process, and the resulting contracts and agreements, when released to the public, are difficult to understand, much less to evaluate for their implications for the state's water resources. By comparison, the Bureau of Reclamation has adopted and uses procedures that ensure that contracts and transfer agreements involving water from the Central Valley Project are developed in full view of the public, from the proposal stage through negotiations to the final decision-making. In addition, the Bureau of Reclamation requires the submission of a standardized annual report from entities that receive water from the Central Valley that includes a full water balance, including production from all sources, system losses, and changes in storage and water use as a condition in its contracts and transfer agreements (U.S. Bureau of Reclamation 2011).~~

## **Problem Statement**

Improved information needed on water use and management in California.

## **Policies Recommendations**

WR ~~R10~~P5     The Legislature should consider amendments to the Water Code to standardize the collection and compilation of data regarding diversion and use of water from the Delta and its watershed. To be consistent with the Delta Plan, future contracts and agreements to export water from the Delta and/or to move water through the Delta shall be developed in a transparent manner consistent with the public process employed by the U.S. Bureau of Reclamation for Central Valley Project water supply contracts and transfers.

WR R11     The Legislature should consider amendments to the Water Code to expand the State's ability to enforce water rights by explicitly authorizing SWRCB to hire administrative law judges or similar hearing officers with authority to review and enforce proscriptions against illegal diversions. Funding should be designated to provide adequate resources to support these investigations and adjudications.

## **Recommendations**

WR ~~R12~~R5     The Department of Water Resources, in coordination with the State Water Resources Control Board, Regional Boards, the Department of Public Health and the Council, should complete the proposed Water Planning Information Exchange (Water PIE) by January 1, 2014. This new electronic system should consolidate information in an electronic format and make it available online. It should be designed to simplify reporting processes, reduce the number of required reports, and be coordinated with the reporting requirements for the Urban Water Management Plans/Agricultural Water Management Plans and Integrated Regional Water Management Plans. Water users that receive water diverted or exported from the Delta or the Delta watershed should be full participants in the Water PIE when it becomes available. The information collected through the Water PIE should be published and incorporated in the analysis for the California State Water Plan Update every five years.



## Groundwater

Groundwater is a major source of California's water supplies. It provides roughly 30 percent to 40 percent of the state's gross urban and agricultural water use (Hanak et al. 2011). Despite the critical nature of this water supply to the state, especially during dry years, California does not have a statewide management program or statutory permitting system for groundwater. Improved groundwater management, especially in basins that are chronically over-pumped, is needed to achieve the coequal goals.

The state has a long history of managing groundwater through locally controlled activities. In several areas of the state, local and regional agencies have developed voluntary sustainable groundwater plans and some have adopted groundwater ordinances under their police powers. In others, groundwater overdraft, contamination, and other serious water management problems have forced the adjudication of groundwater basins through court or administrative proceedings and to the establishment of mandatory sustainable groundwater management criteria including "safe-yield" and replenishment obligations.

The state has tried to encourage voluntary development of locally controlled groundwater management plans through AB 3030, SB 1938, AB 303, and the Integrated Regional Water Management program (Propositions 50 and 84) and by limiting availability of state funding (bonds or state revolving fund loans) for water infrastructure only to those agencies that have these plans in place. However, local groundwater management plans are required to comply with only 6 out of the 14 plan core elements recommended by the Department of Water Resources, which means that the plans can qualify for funding without fully providing for sustainable management of the groundwater basins (Department of Water Resources 2008). Additionally, the 2009 Delta Reform Act established a voluntary program for the collection of groundwater elevation data.<sup>7</sup> The Department of Water Resources has created the California Statewide Groundwater Elevation Monitoring Program (CASGEM), which will collect groundwater elevations and make the data available online. The first reporting deadline is January 1, 2012.

Although the state has made progress in encouraging more sustainable management of groundwater, unregulated pumping and severe groundwater overdraft in some regions of California has created serious economic and environmental consequences. A recent simulation of groundwater conditions in the Central Valley for 1962–2003 estimates that groundwater storage has decreased by almost 58 million acre-feet (Faunt et al. 2009). Additionally, a recent NASA study using data from the Gravity Recovery and Climate Experiment (GRACE) satellite mission suggests that 16.5 million acre-feet were taken out of groundwater storage in the Central Valley between October 2003 and March 2010 (Famiglietti et al. 2011). The costs of chronic overdraft in terms of damage to streets, bridges, canals, and the aquifer itself resulting from subsidence, reduced groundwater availability during droughts, groundwater quality, higher pumping costs to other water users in the region, and environmental damage to streams and wildlife are significant.

Further, the state has not conducted a comprehensive assessment of California's groundwater basins using field data since Bulletin 118-80 was published in 1980—over 30 years ago. The Department of Water Resources provides an estimate of groundwater conditions, including overdraft, in Bulletin 118 updates as well as in the California Water Plan, but the numbers need to be further substantiated with current data and analysis. The Department of Water Resources is in the process of updating the California Water Plan (2013) and has initiated an effort to expand information about statewide and regional groundwater conditions and will include case studies to illustrate successful regional strategies and opportunities for conjunctive management, groundwater banking, and integrated flood management.

Information on changes in groundwater storage, as well as on groundwater overdraft, are vital to the sustainable management of California's groundwater resources and to improved reliability of the state's

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<sup>7</sup> SBx7-6 (Senate Bill 6) adds to and amends parts of Division 6 of the Water Code, specifically Part 2.11 Groundwater Monitoring. The law requires that local agencies monitor and report the elevation of their groundwater basins to help better manage the resource during average water years and drought conditions.

overall water supplies. This information is also a critical element in the CALSIM modeling used by the Department of Water Resources to evaluate State Water Project water operation scenarios and resulting environmental impact assessments. The state needs this information to sustainably manage California's groundwater resources and to improve reliability of the state's water supplies.

### **Problem Statement**

Sustainable groundwater management is needed.

### **Policies**

At this time, there are no policies with regulatory effect included in this section.

### **Recommendations**

- | WR ~~R12R6~~ The Department of Water Resources, in collaboration with the U.S. Geological Survey and other federal, state and local agencies, should update Bulletin 118 using field data, California Statewide Groundwater Monitoring Elevation Monitoring (CASGEM), groundwater agency reports, satellite imagery and other best available science by January 1, 2015. This information will be available for inclusion in the Urban Water Management Plans and Agricultural Management Plans that are required to be submitted to the state by December 31, 2015.
- | WR ~~R13R7~~ To be consistent with the Delta Plan, water suppliers that deliver water diverted or exported from the Delta or the Delta watershed and that receive a significant percentage of their water supplies from groundwater sources should develop sustainable groundwater management plans that are consistent with both the required and recommended components of local groundwater management plans identified by the California Department of Water Resources (Bulletin 118, Update 2003).
- | WR ~~R14R8~~ Local and regional agencies in groundwater basins that have been identified by the Department of Water Resources as being in chronic overdraft should develop a sustainable groundwater management plan, consistent with both the required and recommended components of local groundwater management plans identified by the California Department of Water Resources (Bulletin 118, Update 2003), by January 1, 2015. If local or regional agencies fail to develop and implement these groundwater management plans, the State Water Resources Control Board should take action to determine if the continued overuse of a groundwater basin constitutes a violation of the state's Constitution Article X, Section prohibition on unreasonable use of water and whether a groundwater adjudication is needed to prevent the destruction of or irreparable injury to the quality of the groundwater.

## **Performance Measures**

- φ Improved Regional Self-Sufficiency
  - Conservation – status of progress in achieving 20 percent by 2020 and other SBx7-7 requirements
  - Local water supply development (total and by type of supply)
  - Percentage of retail water rate structures that promote water conservation
- ~~φ Reduced dependence on the Delta~~
  - Percentage of plans that identify actions that will reduce ~~are reducing~~ future dependence on the Delta watershed



- φ Improved regional water balance
  - [Whether legislation requiring Number of Urban Water Management Plans/Agricultural Water Management Plans/Integrated Regional Water Management Plans ~~that have completed to include~~ a Water Sustainability Element has been enacted, and if so how many plans include such an element and developed have a plan for achieving regional water balance](#)
- φ Improved reliability of State Water Project deliveries
  - Report in terms of long-term average reliability of the system
- φ [Improved enforcement to prevent illegal diversions within the Delta](#)
- φ [Percent of groundwater aquifers, that are used to meet urban water needs of 3,000 people or more and/or xx acres of irrigated agriculture \(consistent with AWMP requirements\), are managed or adjudicated. ~~Number of AB 3030 groundwater management plans \(with all Department of Water Resources identified requirements and recommendations\) in place~~](#)
- φ Status of Water PIE development, implementation and participation

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# Chapter 5

## Restore the Delta Ecosystem

The Act defines “restoration” as “...the application of ecological principles to restore a degraded or fragmented ecosystem and return it to a condition in which its biological and structural components achieve a close approximation of its natural potential, taking into consideration the physical changes that have occurred in the past and the future impact of climate change and sea level rise” (Water Code section 85066). The Act also recognizes the value of the Delta as “... the most valuable estuary and wetland ecosystem on the west coast of North and South America” (Water Code section 85022) and provides multiple references to specific features or ecosystem function to be “protected, restored or enhanced” in meeting the coequal goals.

An overarching goal for ecosystem restoration in the Sacramento-San Joaquin Delta Reform Act is to restore fisheries and wildlife to include more viable populations of native resident and migratory species. Doing so requires consideration of the ways that native species used native Delta landscapes to meet their needs at each stage of life. Native species are populations adapted to the historical climate, hydrology, and landscape pattern of the estuary (Grossinger et al. 2010). Therefore, it is a fundamental principle that conservation of native species is promoted by restoration of landscape attributes, connections, and processes at scales that allow for full expression of native species life history strategies (Moyle et al. 2010). Restoration of the current “domesticated” Delta back to the historical, “wild” landscape is not possible, but two categories of understanding help to meet restoration goals. The first is to understand historical patterns and processes to the extent we can. The second is to apply principles of landscape ecology so that restored ecosystems have adequately scaled patterns and processes, are resilient to disturbances, and give competitive advantages to native species.

## The Historical Delta Ecosystem

The Delta was historically a 700,000-acre mosaic of variable landscape types influenced by tides and river flows (historical Delta figure from Chris Enright using Brian Atwater data). Current research shows that overall, historical Delta landscapes were spatially quite stable, but showed considerable seasonal and interannual variability in flow characteristics and inundation patterns. The historical Delta can be divided into three primary landscapes. These landscapes can be classified into (1) flood basins in the north Delta, (2) tidal islands in the central Delta, and (3) distributary rivers (multiple branches flowing away from main channels) in the south Delta (Grossinger et al. 2010; Whipple et al. 2010, 2011).

The flood basins in the north Delta occurred at the interface between fluvial (riverine) and tidally influenced portions of the Delta where the Sacramento River entered the Delta. One defining characteristic of this region was a broad zone of non-tidal, freshwater, emergent plant-dominated wetlands that graded into tidal freshwater wetlands. These wetlands were dominated by dense stands of tules. In addition, shallow perennial ponds and lakes, riparian forests along natural levees, and seasonal wetlands were common features of the historical north Delta. The historical central Delta included about 200,000 acres of tidal islands with freshwater emergent plants that were inundated regularly by spring tides (tides when differences between high and low tides are the greatest). Banks of the tidal islands were

commonly covered in tules with willows, grasses, sedges, shrubs, and ferns on the islands themselves. The historical south Delta contained a complex network of distributary channels with low natural levees, large woody debris, willows, and other shrubs with upland areas supporting open oak woodlands. Historical data from the Delta paint a picture of rich habitat complexity at multiple spatial and temporal scales (Grossinger et al. 2010; Whipple et al. 2010, 2011).

Domestication of the historical Delta landscape and ecosystem over the past 160 years has involved constructing about 1,100 miles of levees, draining the lands behind the levees for crop production, and diverting water to the southern part of the state (Hanak et al. 2011). This has produced a rich agricultural and urban economy within the Delta and far beyond its borders, but it has come at a cost to the original estuarine ecosystem and its native species. Many native species are in decline, and some are close to extinction; one fish species already extinct. More than 90 percent of wetlands have been lost to diking and draining, and floodplains in and upstream the Delta have been cut off from rivers.

Most tributary rivers flowing to the Delta have been dammed. Access to areas critical to fish lifecycles is now greatly reduced, including reaches of tributary rivers and streams critical to the state's iconic salmon. The once pronounced seasonal and interannual flow variability has made way to more stable conditions, and the formerly highly complex landscape described above has been replaced by a much more uniform landscape resembling a simplified, spatially and temporally fixed grid of (fewer) river channels used for north-south and east-west water conveyance. The channels are abruptly separated by artificial levees from dry, farmed islands and interspersed by a few large and shallow open water areas (flooded islands).

Cultivation of the peat soils also has produced subsided islands (polders) where much of the Delta is now below sea level (Lund et al. 2010). Non-native species continue to increase in the San Francisco Estuary (Cohen and Carlton 1998), and Delta fish communities continue to change in composition with native pelagic (open water) fishes undergoing a recent sharp decline (Sommer et al. 2007, Healey et al. 2008). Ecosystem restoration within the Delta landscape will not restore the historical "wild" Delta, but knowledge of the historical Delta informs managing the future by identifying what landscape elements best fit various localities where restoration projects are practical and feasible.

## Landscape Ecology

Return to the historical Delta is not possible or even desirable, because ecosystems are always responding to natural and anthropogenic drivers of change (Folke et al. 2010). This is recognized in the definition of restoration in the Act with the goal of "...close approximation of its natural potential..." (Water Code section 85066). Envisioned restoration actions, although extensive, will nevertheless cover only a fraction of the Delta and its watershed. Therefore, effective Delta restoration requires strategies to make limited available land mimic historical landscape functions sufficiently enough that native species can use them to meet their needs. In this context, landscape restoration should not be defined by its extent alone. Rather, it is more usefully defined by relationships between interacting mosaics of elements that allow energy flows between them and corridor connections that species can navigate (Wiens 2002, Lindenmayer et al. 2008). Taking a landscape perspective and applying the principles of landscape ecology focuses on three concepts (Turner 1998). The first concept is that landscape patterns and the spatial scales at which they occur determine species responses. The landscape perspective identifies and describes the agents of pattern formation, including physical processes such as hydrology, chemical processes such as nutrient cycling, biological processes such as vegetation patterns, and the ways all processes can be "disturbed" by events such as floods and droughts. Second, the landscape perspective considers broader spatial extents than those traditionally studied in ecology. The emphasis is on identifying scales that support relationships between spatial heterogeneity and the life history of native species. For example, in the Delta, the characteristic length of the tidal excursion is a spatial scale and pathway that ties together different habitat types within one-half of a tidal cycle. Third, the landscape perspective explicitly considers the role of humans in creating and affecting landscape patterns and

process. Humans play a dominant role in influencing relationships between spatial patterns and ecological processes. Indeed, the restoration goals of the Delta Plan are an example of this influence.

The landscape perspective with its focus on spatial patterns is important to resource managers because context matters. Restored landscapes have neighboring land uses, including agriculture and urban areas. Each land use affects the other because they are connected by air, land, and water; yet humans desire often conflicting services from each. In addition, ecosystem function depends on the interplay of pattern and process over broad spatial extents and, therefore, necessarily includes the role of humans in creating and affecting these relationships. Finally, understanding that human activities can dramatically alter landscape context and the relationship between patterns and processes, resource managers have a stewardship responsibility to understand and manage these impacts.

## Ecosystem Restoration

Delta ecosystem restoration involves adaptive management (see Chapter 2) of landscapes, ecosystems, habitats, communities, and species. The word “ecosystem” has many definitions. One straightforward definition is “an ecological community together with its environment, functioning as a unit.” A more scientific definition is “a community of organisms together with their physical environment, viewed as a system of interacting and interdependent relationships and including such processes as the flow of energy through trophic levels and the cycling of chemical elements and compounds through living and nonliving components of the system.” Importantly, ecosystems also include people. Whole ecosystems have been a management focus for several decades. The early term “ecosystem management” has more recently made way to the scientifically more accurate term “ecosystem-based management,” which explicitly recognizes that humans cannot control many important ecosystem attributes and, thus, cannot deliberately manipulate or manage entire ecosystems—humans can really only control and manage human activities that affect ecosystems (McLeod et al. 2005). The goal of management aimed at whole ecosystems is the long-term protection of ecological processes, structures, and interconnections needed to maintain the health, productivity, and resilience of ecosystems so that they can provide the services humans want and need (Grumbine 1994, Christensen et al. 1996, Szaro et al. 1998, McLeod et al. 2005). The concept of ecosystem restoration involves returning ecosystem processes, structures, and interconnections to a more natural or healthy condition that can be sustained over the long term.

While ecosystem-based management and restoration is concerned with the whole system, specific management actions are often aimed at individual “elements of concern” such as individual species or communities and their habitats, and on the processes that generate and sustain these elements (e.g., selection, trophic interactions, element cycling, or disturbance). Furthermore, ecosystems exist at several spatial scales, but goal-oriented ecosystem management requires the identification of geographically bounded “places of concern” that exist in a larger landscape context (Lackey 1998). What is “of concern” reflects prevailing social and economic needs and values along with scientific understanding of the ecological processes and structures that sustain them. Definition of what is “of concern” is required to set actionable management goals and targets, but ecosystem management and restoration can and should not proceed without consideration of the larger social, ecological, and landscape context.

In the Delta, places of concern include regularly wetted places such as tidal marshes, brackish water marshes, floodplains, and channel margins as well as mostly dry places such as riparian zones and open and wooded upland areas. Processes of concern include the delivery of fresh and salt water; the transport, cycling, and deposition of sediments, nutrients, and contaminants; trophic interactions; and the colonization and succession involved in building biological communities. Together, the places and processes determine the quantity and quality of habitat available to species of concern in the Delta, such as desirable native resident and migratory species or harmful non-native species, and the human inhabitants of the Delta. Ecosystem goods and services of concern include the provision of fresh water, food, recreational opportunities, cultural heritage and spiritual benefits, and water and air purification.

What then constitutes successful ecosystem restoration within the Delta? Palmer et al. (2005) propose five criteria for measuring success from an ecological perspective. First, the project should be based on a clear guiding image of the type of dynamic and healthy ecosystem to be achieved. Second, the ecological condition must be measurably improved. Third, the ecosystem should be more resilient and self-sustaining to perturbations and disturbances. Fourth, construction should produce no lasting harm. Fifth, both pre-assessment and post-assessment must be completed with public communication of results. Standards of evaluation for each of the five criteria lead to logical performance measures for restoration projects.

It is important to realize that landscapes, and the ecosystems and habitats they contain are not static; they change over time in response to numerous natural and anthropogenic drivers of change (Manning et al. 2009, Harwell et al. 2010, Delta Independent Science Board January 2011). Change is inevitable, but more resilient landscapes and ecosystems can adapt without fundamentally or overly rapidly changing how they look and function (Folke et al. 2004). The capacity for ecological resilience is increasingly challenged worldwide by global drivers such as global climate change and human population growth, as well as by drivers once considered of more local importance, for example, past and present human land use (Foster et al. 2003, Foley et al. 2005). The Delta of the future must contend with two important drivers: (1) global drivers, such as sea level rise, increasing flow variability, and changing amounts of rain and snow; and (2) key local drivers, such as land use changes, nutrient additions, legacy and emerging contaminants, and altered hydrology.

What does a changing Delta mean to the fish communities that use the Delta? Lund et al. (2010) have considered how changing habitats and various conveyance options might affect fish populations of the future Delta. Their assessment led to five main conclusions. First, large-scale ecosystem change is inevitable, and the future Delta will be very different from both the current and historical Delta. Second, variability in water quality and the flow regime is necessary to reverse the decline to desirable fish species. Third, groups of fishes (smelt, anadromous, freshwater benthic, freshwater zooplanktivores, and slough-resident fishes) are favored by differing management strategies. Fourth, any water export strategy must restore habitat diversity and function throughout the Delta and Suisun Marsh. Fifth, large-scale experimentation to optimize management strategies is needed. Improved flow regimes, greater habitat diversity, and better water quality are key characteristics for achieving a healthier Delta.

In summary, ecosystem restoration in the Delta should be based on principles of landscape ecology and ecosystem management that consider content (“elements of concern”), context (larger scale patterns and processes), the history that has resulted in the current state of the ecosystem, and tradeoffs involved with reaching envisioned “healthy” states. Successful large-scale ecosystem restoration within the Delta will be dependent on restoring key patterns, processes, and environmental conditions, including (1) creating a more natural flow regime; (2) increasing and maintaining the extent, quality, diversity, and connectivity of estuarine habitats supporting native aquatic species; and (3) reducing threats and stresses to native species and habitats. Therefore, the policies and recommendations for ecosystem restoration focus on these three key requirements.

## **Policies and Recommendations**

### **Creating a More Natural Flow Regime**

Flow is a major determinant of physical habitat and biotic composition in riverine and estuarine ecosystems such as the Delta. Native aquatic species have evolved life histories in direct response to natural flow regimes. The ecological integrity of aquatic ecosystems depends on the natural dynamic character of the ecosystems in which plants and animals have evolved (Poff et al. 1997). Flow is not simply the volume of water, but also includes the timing of flow, the frequency of specific flow conditions, the duration of various flows, and the rate of change in flows. Bunn and Arthington (2002)



present four key principles showing the links between hydrology and aquatic biodiversity and the impacts of altered flow regimes. The principles are as follows: (1) flow determines physical habitat, (2) aquatic species have evolved life history strategies based on natural flow regimes, (3) upstream-downstream and lateral connectivity are essential to organism viability, and (4) invasion and success of non-native species is facilitated by flow alterations. Altered flow regimes have been shown to be a major source of degradation to aquatic ecosystems worldwide (Petts 2009).

The California State Water Resources Control Board (State Water Resources Control Board 2010) has recently presented summary determinations regarding flow criteria for the Sacramento-San Joaquin Delta ecosystem. Some key points are as follows: (1) non-flow changes like nutrient composition, channelization, habitat, invasive species, and water quality need to be addressed along with flows, (2) flow and physical habitat interact in many ways, but they are not interchangeable, (3) percent of unimpaired flow into the Delta is one pathway for setting flow criteria, (4) more natural flows are important to migratory cues of many fish species, (5) positive changes in flow or flow patterns benefit both humans and fish and wildlife, and (6) a coordinated land use policy within the Delta is needed. Creating a more natural flow regime within the Delta is an important step in meeting the coequal goal of a healthier Delta ecosystem.

### ***Flow Regime Problem***

Altered Delta flow regimes are detrimental to native aquatic species and encourage non-native aquatic species.

### ***Policies***

ER P1     Refer to WR P4.

## **Improving Habitat**

Habitat is a fundamental ecological concept that refers to the place where an organism lives. This “place” is defined by physical, chemical, and biological variables (environmental structure and processes) that provide the conditions and resources a given organism needs to survive and reproduce—“wherever an organism is provided resources that allow it to survive, that is habitat” (Hall et al. 1997). In this definition, habitat is specific to a particular organism or species, and **habitats are species-specific components of ecosystems**. Sufficiently good habitat quantity and quality is needed to allow individuals and populations to persist. The term habitat (or “habitat type”) is also often used when referring to land cover types (e.g., open water and riparian vegetation). It is, however, important to note that land cover by itself is usually not enough to determine if the covered “place” will in fact provide good-quality habitat for a specific organism. Habitat and land cover type are not the same thing (Lindenmayer et al. 2008); an organism’s habitat is much more than land cover type, just like a person’s home is much more than a house. For example, the total area of the Delta covered by open water has not substantially changed over the last few decades, but several open water (pelagic) fish species have undergone steep declines (Sommer et al. 2007), suggesting that at least some of the open water areas in the Delta have become inhospitable to these fishes—the actual habitat available to these open water species has shrunk, even though the area covered by open water has remained fairly stable. Similarly, changing land cover patterns (e.g., increasing open water areas) does not automatically lead to increases in specific target species if detrimental conditions (e.g., poor water quality or high entrainment or predation risk) make these areas unsuitable as new habitat.

As “places,” habitats are species-specific “patches” in spatially heterogeneous landscapes. These patches are separated from surrounding areas by sharp or more gradual edges (Fischer et al. 2004) and may be connected to other similar patches by “corridors.” Landscape structure (composition and configuration) affects the abundance and distribution of habitats and the organisms they support. The occurrence and

abundance of organisms is closely associated with the total amount of usable habitat in a landscape as well as with habitat patch sizes, shapes, and arrangements (e.g., Hannon and Schmiegelow 2002). Habitats that are too small, fragmented, or isolated may not support specific organisms over the long term—they are, in effect, no longer functional habitats for these organisms. Because habitats are species specific, their necessary size, shape, and arrangement in a landscape differ among species. In general, however, more, larger, and better connected patches of a specific habitat are more likely to provide the conditions for the persistence of organisms associated with that habitat (Lindenmayer et al. 2008).

Habitat loss and fragmentation due to human land use is an important driver of worldwide species losses (Foley et al 2005). In estuaries and coastal areas, overexploitation (e.g., overfishing) and habitat destruction have been identified as the leading causes of species declines and extinctions (Lotze et al. 2006). Habitat restoration can lead to species recovery, especially when carried out in combination with the reduction of other impacts such as exploitation, predation, or pollution (Lotze et al. 2006).

**Habitat in the Delta:** The Delta is continually changing, but changes over the last 160 years have been particularly rapid and dramatic (Healey et al. 2008, Moyle et al. 2010, Baxter et al. 2010). Less than 2 centuries ago, diverse and extensive estuarine landscape features ranging from open water to tidal and seasonal wetlands and forested uplands contained a multitude of habitats that supported a productive native flora and fauna adapted to the highly variable environmental conditions of the Delta. Although the present Delta continues to be a productive ecosystem, its current landscape and habitats support a much different species assemblage than the historical Delta. Many of the currently thriving species are non-native species (Cohen and Carlton 1995). They include species considered desirable (e.g., largemouth bass, a sport fish) and undesirable (e.g., the Brazilian water weed *Egeria densa*) or even harmful (e.g., the harmful cyanobacteria *Microcystis aeruginosa*) by humans. These non-native species generally evolved in different habitats with much less variable conditions (Moyle et al. 2010). In contrast, current habitat conditions are insufficient to sustain a number of aquatic and terrestrial native species such as the fishes involved in the sudden “Pelagic Organism Decline” of the 2000s (Sommer et al. 2007, Baxter et al. 2010), as well as winter- and spring-run Chinook salmon, giant garter snake, and Suisun thistle, among others (Moyle et al. 2010; Healey et al. 2008).

## **Problem Statement**

Landscape attributes and environmental conditions have changed dramatically in the Delta and the Suisun Marsh over the last 160 years. The resultant **rapid reduction in the extent, quality, and diversity of estuarine habitats supporting native aquatic species has led to declines in populations of native resident and migratory species.** Although the Delta and the Suisun Marsh remain productive parts of the San Francisco Estuary ecosystem, their unique, native natural heritage and prized ecosystem services (e.g., the provisioning of native salmon as a food source, for recreation, and as a source of cultural, intellectual and spiritual inspiration) are in danger of being irretrievably lost.

## **Policies**

ER P2 Actions that include ecosystem restoration shall be consistent with the following sections from the *Draft Ecosystem Restoration Program’s Conservation Strategy for Stage 2 Implementation for the Sacramento-San Joaquin Delta Ecological Management Zone* (California Department of Fish and Game 2010):

- ϕ map and legend of Figure 4, page 35, “Land Elevations in the Delta Ecological Management Zone will largely determine what habitat types can be accommodated,” and accompanying text on pages 33-46; and
- ϕ map and legend of Figure 5, page 47, “Map of Ecological Management Units within the Delta Ecological Management Zone,” and accompanying text on pages 46-49.

The Council may incorporate revised figures from the Ecosystem Restoration Program's Conservation Strategy as it is revised.

- ER P3 Actions other than ecosystem restoration shall determine if the action would adversely impact the opportunity for ecosystem restoration at the elevations shown in Figure 4 and in the Ecological Management Units shown in Figure 5, and as explained in the accompanying text of those figures. These actions shall demonstrate that any such adverse impacts will be fully avoided or minimized. Certification of consistency associated with these actions shall consider the habitat values described generally in Section 2 of the *Draft Ecosystem Restoration Program's Conservation Strategy for Stage 2 Implementation for the Sacramento-San Joaquin Delta Ecological Management Zone* (California Department of Fish and Game 2010) and subsequent revisions of this document.
- ER P4 Protection of floodplains in the Delta and Delta watershed is critical for achieving the coequal goals, reducing flood risk, and preserving the unique character of the Delta. For actions outside the Delta, this policy is a recommendation. To be consistent with the Delta Plan:
- ϕ Actions affecting floodplains in the Delta or in the Delta watershed must demonstrate that impacts on the potential for ecosystem restoration or flood management have been fully considered and avoided or minimized.
  - ϕ Actions shall demonstrate that they would maintain or expand remaining large blocks of intact habitat or natural landscape, including floodplains, as described in the California Essential Habitat Connectivity Project (Department of Transportation and Department of Fish and Game 2010).
  - ϕ State and local agencies constructing new levees, substantially rehabilitating or reconstructing existing levees in the Delta and Delta watershed shall evaluate and incorporate alternatives (including use of setback levees) that would increase the extent of floodplain and riparian habitats.
- ER P5 New or amended local or regional land use plans shall not substantially reduce opportunities for ecosystem restoration, habitat creation, channel modification for ecosystem benefit, or increased connectivity between water and land; or direct such uses away from their most effective locations as identified in the maps, legends and accompanying text of Figures 4 and 5 of the *Draft Ecosystem Restoration Program's Conservation Strategy for Stage 2 Implementation for the Sacramento-San Joaquin Delta Ecological Management Zone* (California Department of Fish and Game 2010).

## **Recommendations**

- ER R1 The Council acknowledges the importance of expediting habitat restoration in the Delta, and recommends the prioritization and implementation of restoration projects in the following areas:
- ϕ Yolo Bypass
  - ϕ Cache Slough Complex
  - ϕ Lower San Joaquin River Floodplain
  - ϕ Suisun Marsh
  - ϕ Cosumnes River/Mokelumne River Confluence

The Council shall develop a restoration strategy and suite of specific actions for habitat restoration in the priority areas and throughout the Delta to meet the objectives defined in Water Code 85022(d) and 85302(e). Specific measures shall be incorporated

in the Delta Plan for the development of new or improved habitat, protection of existing habitat, and to facilitate the restoration of large areas of interconnected habitat within the Delta and its watershed.

ϕ

ER R2 As part of its Strategic Plan, the Delta Conservancy should:

- ϕ Develop and adopt criteria for prioritization and integration of large-scale ecosystem restoration in the Delta, with sustainability and use of best available science as foundational principles.
- ϕ Develop and adopt methods and processes for ownership and long-term operations and management of restored and/or conserved land in the Delta and Suisun Marsh.
- ϕ Recommend sources for long-term financing for programs and projects that include covering costs of long-term operations and management and “Payment in Lieu of Taxes.”
- ϕ Develop and adopt a formal mutual agreement with the Department of Water Resources, Department of Fish and Game, federal interests, and other State and local agencies on implementation of ecosystem restoration.
- ϕ Develop in conjunction with the Wildlife Conservation Board, the Department of Water Resources, Department of Fish and Game, and other State and local agencies, a plan and protocol for acquiring the land necessary to achieve ecosystem restoration consistent with the coequal goals and the *Draft Ecosystem Restoration Program’s Conservation Strategy*.

## Reducing Threats and Stresses

Ecosystem restoration cannot succeed in the face of persistent threats to the well-being of the habitats and species it seeks to restore. The current degraded habitat conditions for many native Delta species are the result of the combined impacts of multiple drivers and stressors, including physical and chemical habitat degradation, increased mortality from entrainment into water diversions and from predation, and insufficient food resources (Sommer et al. 2007, Baxter et al. 2010, Delta Independent Science Board January 2011). Expected climate change impacts (e.g., higher temperatures) will likely further degrade native species habitat in the Delta, while benefitting many non-native species. Successful recovery of native species requires aggressive habitat restoration aimed at increasing the extent, quality (including connectivity), and diversity of native species habitats, and improvement of habitat conditions through reduction of multiple threats and stresses on native species habitats. Conversely, invasive species can only be successfully controlled by the reduction of habitat conditions that favor these species over native species.

### **Problem Statement**

Habitat suitable for non-native invasive species has increased in the Delta and the Suisun Marsh, and many non-native species are now thriving. New species continue to arrive every year. **Although some key non-native species are considered desirable by humans, others are undesirable or harmful.** None of these species is part of the unique native natural heritage of the Delta and the Suisun Marsh, but some have been here for more than a century and have become an integral part of this ecosystem.

### **Policies**

ER P6 Actions shall demonstrate that the potential for new introductions of or improved habitat conditions for non-native invasive species have been fully considered and avoided or minimized in a way that appropriately protects the ecosystem.

## Recommendations

- ER R3 Pending development and adoption of an invasive species management plan for the Delta, the Department of Fish and Game should fully implement the following sections of the *Draft Ecosystem Restoration Program's Conservation Strategy for Stage 2 Implementation for the Sacramento-San Joaquin Delta Ecological Management Zone (Department of Fish and Game 2010)*:
- φ List of "Potential Stage 2 Actions for Non-Native Invasive Species" on p. 54; and
  - φ Text in section "III.B. Invasives" on pages 53-58.
- ER R4 By January 1, 2013 the Delta Science Program, in conjunction with the Department of Fish and Game, the Department of Water Resources and other relevant agencies should conduct workshops with the objective of providing specific recommendations to the Council for measures to minimize stressor impacts on the Delta ecosystem and on the prioritization of such measures.

## Bay Delta Conservation Plan

The Bay Delta Conservation Plan ([BDCP](#)) is a 50-year plan being prepared through a collaboration of State, federal, and local water agencies, State and federal resource agencies, environmental organizations, and other interested parties. [The BDCP is being developed in compliance with federal and state endangered species acts to help restore fish and wildlife species and provide for the protection and restoration of water supplies while minimizing impacts to Delta communities and farms.](#) It will be incorporated into the Delta Plan if it meets the requirements of Water Code section 85320, including the approval by the Department of Fish and Game of the Bay Delta Conservation Plan as a natural community conservation plan and its approval as a habitat conservation plan pursuant to the federal Endangered Species Act. [The BDCP seeks to improve the Delta ecosystem through a comprehensive approach to addressing species needs and ecological processes. The plan will include a scientifically-based adaptive management program to ensure incorporation of new scientific information into decisions on water management and conservation measures.](#)

## Problem Statement

The Bay Delta Conservation Plan is expected to significantly ~~affected~~[advance](#) the coequal goals required by the Delta Reform Act. [BDCP proposed measures to address ecosystem restoration, water conveyance, and reduce stressors to native species would contribute to meeting the following Delta Plan recommendations: ER1, ER2, ER3 and WR R3.](#) The Bay Delta Conservation Plan [is a voluntary process that requires the approval of multiple public agencies prior to adoption.](#) The BDCP planning process has been under way since 2006, but the plan ~~will~~[may](#) not be completed prior to adoption of the Delta Plan in 2012.

## Recommendations

- ER R5 ~~The involved federal, State, and local agencies should complete the Bay Delta Conservation Plan process (i.e., receive required incidental take permits) consistent with the Delta Reform Act no later than December 31, 2014.~~ [The Council should monitor the progress of the Bay Delta Conservation Plan. Once the BDCP is finalized and if it is incorporated into the Delta Plan consistent with Water Code section 85320, the Council, Conservancy, and BDCP should coordinate on efficiently implementing adopted actions to achieve the co-equal goals. If the Bay Delta Conservation Plan process is not completed by this date consistent with the Delta Reform Act, the Council will proceed with ecosystem stressor reduction actions identified in the Delta Plan and conveyance planning recommendations independently of the Bay Delta Conservation Plan process for inclusion in the first five-year update of the Delta Plan.](#)



# Performance Measures

Performance measures derive from the goals and objectives in the Act and from requirements for largescale ecosystem restoration within the Delta. The performance measures should address progress in achieving each of the following objectives in the Act:

85302(c) The Delta Plan shall include measures that promote all of the following characteristics of a healthy Delta ecosystem.

- (1) Viable populations of native resident and migratory species.
- (2) Functional corridors for migratory species.
- (3) Diverse and biologically appropriate habitats and ecosystem processes.
- (4) Reduced threats and stresses on the Delta ecosystem.
- (5) Conditions conducive to meeting or exceeding the goals in existing species recovery plans and state and federal goals with respect to doubling salmon populations.

85302(e) The following subgoals and strategies for restoring a healthy ecosystem shall be included in the Delta Plan.

- (1) Restore large areas of interconnected habitats within the Delta and its watershed by 2100
- (2) Establish migratory corridors for fish, birds, and other animals along selected Delta river channels.
- (3) Promote self-sustaining, diverse populations of native and valued species by reducing the risk of take and harm from invasive species.
- (4) Restore Delta flows and channels to support a healthy estuary and other ecosystems.
- (5) Improve water quality to meet drinking water, agriculture, and ecosystem long-term goals.

(6) *Restore habitat necessary to avoid a net loss of migratory bird habitat and, where feasible, increase migratory bird habitat to promote viable populations of migratory birds.*

Performance measures derived from these objectives can be grouped as follows:

## Species Performance Measures:

- φ Progress toward achieving viable populations of native resident and migratory species or species groups
- φ Progress toward achieving recovery for listed species in the Delta
- φ Progress toward achieving the state and federal "doubling goal" for wild, Central Valley anadromous fishes

## Flow Performance Measures:

- φ Successful adoption of criteria for Delta inflows and outflows by January 2, 2014, and the adoption of flow criteria for the major tributary rivers to the Delta by January 2, 2018
- φ Progress toward meeting adopted Delta inflow and outflow criteria and major tributary flow criteria

## Habitat and Migratory Corridor Performance Measures:

- φ Progress toward developing new or improved aquatic and terrestrial habitat, and documented use of these habitats by key species

- φ Progress toward protecting existing habitats and documented use of these habitats by key species
- φ Progress toward restoring large areas of interconnected habitats for native resident and migratory species in the Delta and its watersheds by 2100
- φ Acres of habitat conserved for native resident and migratory species in the Delta
- φ Progress toward achieving diverse and biologically appropriate habitats and ecosystem processes
- φ Progress toward restoring habitat that is necessary to avoid a net loss of migratory bird habitat
- φ Quantity of permanent or appropriate seasonal connectivity along all major migratory routes to allow adequate migration between native fish spawning, rearing, and migration habitat
- φ Quantity of contiguous corridors for migration of fish and birds, and documented use of these corridors by key species
- φ Rates of key processes (e.g., primary production, decomposition, nutrient uptake, and respiration) in restored habitats compared to non-restored habitats

Threat and Stressor Performance Measures:

- φ Progress toward reducing numbers and proportion of native resident and migratory species (as larvae, juveniles, or adults) taken at water diversion points
- φ Progress toward decreasing annual trend in number of new, uncontrolled harmful invasive species
- φ Progress toward decreasing abundance and distribution of harmful invasive aquatic and terrestrial species
- φ Reduced concentrations of nutrients (nitrogen and phosphorus compounds) that support the growth of undesirable algae or excessive growth of nuisance aquatic plants

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AGENDA ITEM 7  
APPENDIX A  
THIRD STAFF DRAFT DELTA PLAN

# **Chapter 7**

## **Reduce Risk to People, Property, and State Interests in the Delta**

Water Code sections 85305, 85306, 85307, and 85309 require the Delta Plan to include specific objectives.

85305. *(a) The Delta Plan shall attempt to reduce risks to people, property, and state interests in the Delta by promoting effective emergency preparedness, appropriate land uses, and strategic levee investments.*

*(b) The council may incorporate into the Delta Plan the emergency preparedness and response strategies for the Delta developed by the California Emergency Management Agency pursuant to Section 12994.5.*

85306. *The council, in consultation with the Central Valley Flood Protection Board, shall recommend in the Delta Plan priorities for state investments in levee operation, maintenance, and improvements in the Delta, including both levees that are a part of the State Plan of Flood Control and non-project levees.*

85307. *(a) The Delta Plan may identify actions to be taken outside of the Delta, if those actions are determined to significantly reduce flood risks in the Delta.*

*(b) The Delta Plan may include local plans of flood protection.*

*(c) The council, in consultation with the Department of Transportation, may address in the Delta Plan the effects of climate change and sea level rise on the three state highways that cross the Delta.*

*(d) The council, in consultation with the State Energy Resources Conservation and Development Commission and the Public Utilities Commission, may incorporate into the Delta Plan additional actions to address the needs of Delta energy development, energy storage, and energy transmission and distribution.*

Based upon Water Code Section 85309, the Council shall consider a proposal from the Department of Water Resources, in consultation with the Corps of Engineers and the Central Valley Flood Protection Board, to coordinate flood and water supply operations of the State Water Project and the federal Central Valley Project.



# Chapter 7

## Reduce Risk to People, Property, and State Interests in the Delta

### Introduction

The Delta is an inherently flood-prone area at the confluence of two massive watersheds. The watersheds of the Sacramento and San Joaquin Rivers collectively drain approximately 43,000 square miles. What was historically a tidal marsh formed through the interaction of fluctuating sea levels and an influx of alluvial sediments from river floods has been transformed. It is now a complex labyrinth of reclaimed islands and waterways created through the construction of levees, many of which were constructed over the past 150 years using light equipment and local, uncompacted sediments and organic matter, and with little or no foundation preparation.

The Delta (the legal Delta and Suisun Marsh) includes more than 1,335 miles of levees that protect approximately 839,610 acres of land. These levees face potential threats such as large runoff events, earthquakes, extreme high tides, wind-generated waves, subsidence, and sea level rise. Individually, each of these threats is enough to cause serious concern; together, they represent a potential for catastrophic disruption of the Delta. A mass failure of the levee system would have real life-and-death impacts, and property losses that could total billions of dollars. Levee failures not only create direct damage and potential loss of life from flooding, but also change the configuration of the Delta—both water and land—and alter the mixing of fresh water with salt water. A failure could also have significant effects on California's economy from interruption of service to 25 million urban water users and to approximately 3 million acres of irrigated farmland that depend, in part, on water conveyed through the Delta.

The portfolio of [economically and ecologically based](#) risk-reduction strategies must consider urban and rural communities as well as agricultural lands in the process of identifying evaluating, and prioritizing investments in the levee system. Risks can be reduced through an emergency preparedness, response, and recovery system; appropriate land uses; [land acquisition and conversion to ecosystem functions](#); [subsidence reversal strategies](#); and strategic levee improvements.

Flood risk is assessed in terms of the likelihood of a flood event occurring, the chance of failure from that flood event, and the associated consequences. Consequences can entail loss of life and economic and environmental damage. Risk of flooding in the Delta is likely to increase over time as a result of several factors: continued development within the floodplains, inadequate levees, inadequate channel capacities, seismic vulnerability, continuing subsidence, climate change, and sea level rise. It is estimated that by the year 2100, sea level rise may reach 55 inches (California Climate Action Team 2010, California Ocean Protection Council 2011). Failure of significant parts of the Delta's [current](#) flood management system will be unavoidable. [Given that failures will occur, decisions regarding the prioritization of all future risk reduction measures and costs must be made on the basis of economically, socially and ecologically](#)

justified analyses. Wise public policy calls for the matching of sustainable land uses to levee standards or other risk reduction measures based upon sound economic, social and ecosystem justifications.

Flood risk reduction cannot absolutely prevent harmful inundation from floods, but can reduce its likelihood and social and economic impacts. History has shown that unavoidable structural failures in the system will occur as a result of extraordinary events, imperfect knowledge, and imperfect materials. Risks must be well understood, and then managed and controlled to the extent possible through public awareness, adequate emergency management planning, and enforcement of existing flood management regulations. Many studies and efforts addressing flood management and emergency preparedness, response, and mitigation are underway, and will be considered by the Council for ongoing Delta flood risk management. These studies include the Central Valley Flood Protection Plan, FloodSAFE, and the U.S. Army Corps of Engineers Delta Islands Levees Feasibility Study, the Long Term Management Strategy for Dredging, periodic inspection system, and levee safety action classification system. Once the critical economic, social and ecosystem justifications have been made, the Delta Plan will consider the findings of these studies to guide the Council in implementing its policies and making determinations of consistency. Furthermore, new efforts are needed to match long-term Delta ecosystem plans with economically based risk reduction actions.

This chapter presents economically based risk-reduction policies and recommendations necessary for the achievement of the coequal goals.

## Floodplain and Floodway Protection

Adequate flood flow capacity is critical for managing flood risks to upstream, adjacent, and downstream land uses, and for overall Delta water management and ecosystem integrity. Both the Federal Emergency Management Agency (FEMA) and the State Central Valley Flood Protection Board play a role in designating floodways to accommodate flood flows. “Designated Floodway” refers to the channel of the stream and that portion of the adjoining floodplain reasonably required to provide for the passage of a design flood; it is also the floodway between existing levees as adopted by the Central Valley Flood Protection Board or the Legislature.

The State Central Valley Flood Protection Board, under Section 8609 of the Water Code, has the authority to designate floodways in the Central Valley. Title 23 of California Code of Regulations provides further details of the Board’s regulatory authority; specifically, Article 5, Section 107, regulates land uses in Designated Floodways. Under the National Flood Insurance Program, FEMA establishes regulatory floodways, and participating communities are expected to regulate development within their floodways in accordance with the regulations defined primarily by federal regulations.<sup>1</sup>

Despite these regulations, land use policies guiding development in floodways are not consistent across Delta counties. Additionally, floodways have not been established for many of the channels within the Delta by either FEMA or the State Central Valley Flood Protection Board. In light of these problems, the Delta Plan should address these issues and highlight the need for policies and recommendations that accommodate floodplain and floodway protection. Concerns that floodways may expand and deepen as a consequence of sea level rise and changes to rainfall and snow patterns over the next 100 years must be

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<sup>1</sup> 44 Code of Federal Regulations 60.3(b)(6,7,10) requires the following:

- *Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator;*
- *Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained;*
- *Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community’s Flood Insurance Rate Map (FIRM), unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community.*

addressed and accommodated. Development in existing or future floodplain or bypass locations in the Delta or upstream can permanently eliminate the availability of these areas for future floodplain usage.

### **Problem Statement**

Structures constructed in the floodway that encroach on existing floodplains and potential future floodplain or bypass locations in the Delta and upstream could reduce the flood carrying capacity of the Delta.

### **Policies**

RR P1 Refer to ER P4.

RR P2 Existing or potential value of floodways<sup>2</sup> or potential floodways shall not be encroached<sup>3</sup> upon nor diminished without mitigating for potential or future flood flows, except as provided in this Delta Plan.

RR P3 Existing or potential value of floodplains<sup>4</sup> or potential floodplains shall not be encroached upon nor diminished except as provided in this Delta Plan. The following areas are identified in the Delta Plan as potential floodplains and should also provide ecosystem benefit:

- φ Areas located in the Yolo Bypass from Fremont Weir through Cache Slough to the Sacramento River outside of the existing floodplain easement, including the confluence of Putah Creek into the bypass;
- φ The Cosumnes River/Mokelumne River confluence, as defined by the North Delta Flood Control and Ecosystem Restoration Project (Department of Water Resources 2010);
- φ The San Joaquin River/South Delta Floodplain. This area extends north from the southern boundary of the legal Delta, including all of Pescadero Tract, Paradise Cut and Reclamation Districts R-2075, R-2064, R-2085, R-2094, R-2095, the portion of R-1007 generally north of Bethany Road and the portion of R-2058 north of Interstate 205, and the undeveloped portion of Stewart Tract. This area will be modified upon completion of studies by the Department of Water Resources that will define the floodplain as referenced in Water Code section 9613(c).

### **Recommendation**

RR R1 The Legislature should fund and the Department of Water Resources and the Central Valley Flood Protection Board should complete their investigation of the bypass and floodways in the San Joaquin River to reduce potential flooding near Paradise Cut, as required by Water Code section 9613(c).

RR R2 The current efforts led by the U.S. Army Corp of Engineers—the *San Francisco Bay Long Term Management Strategy for Dredging and the Delta Dredged Sediment Long-Term Management Strategy*—should be continued and supported so that desirable dredging to support the Delta Plan and the coequal goals, might be achieved. Appropriate dredging might

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<sup>2</sup> As defined by California Code of Regulations, Title 23, Division 1, Chapter 1, Article 2, Section 4: (n) Floodway. "Floodway" means the channel of a river or other watercourse and the adjacent land areas that convey flood waters.

<sup>3</sup> As defined by California Code of Regulations, Title 23, Division 1, Chapter 1, Article 2, Section 4: (m) Encroachment. "Encroachment" means any obstruction or physical intrusion by construction of works or devices, planting or removal of vegetation, or by whatever means for any purpose, into any of the following: (1) any flood control project works; (2) the waterway area of the project; (3) the area covered by an adopted plan of flood control; or (4) any area outside the above limits, if the encroachment could affect any of the above.

<sup>4</sup> As defined by the FEMA National Flood Insurance Program: *Floodplain: Any land area susceptible to being inundated by flood waters from any source.* <http://www.fema.gov/business/nfip/19def2.shtm>.

increase flood conveyance while at the same time acquiring material which might be used for levee maintenance (U.S. Army Corps of Engineers 2002).

## Delta Levee Design Criteria

The 1992 Delta Protection Act designated the Delta as a flood-prone area and defined the most appropriate land uses as agriculture, wildlife habitat, and where specifically provided, recreation (Public Resources Code section 29704). Although levees were constructed in the Delta to reduce the risk of flooding, the historical performance of many levees in the Delta is poor. Many levee failures have been attributed to high flood flows, and some levees have failed in the absence of any type of flood. If a significant earthquake does occur on faults near the western Delta, one or more levees could fail or subside (Department of Water Resources 2009). With this in mind, it is more important than ever that the levees in the Delta are designed, constructed, and maintained to provide the level of flood risk reduction commensurate with the ~~land and~~ economic and ecological resource uses they protect on an island by island basis.

As discussed in Delta Vision, the level of flood protection provided by levee classifications should be related to an acceptable risk for the types of land use located behind the levee (Delta Vision Blue Ribbon Task Force 2008). A classification system is needed that aligns levee design with corresponding appropriate land and resource uses, ranging from habitat or ecosystem protection up to protection of large urban areas comprising thousands of people and homes. During the last few decades, state and federal agencies have developed various levee standards. These standards were designed to either establish minimum criteria that would make the levees and the properties protected eligible for grants or rehabilitation funds, or minimum criteria that would allow development behind the levees. While there is a significant history associated with these standards, none are economically based nor do they consider the ecological goals for tidal marsh restoration. Hence, new standards need to be developed expeditiously by the Federal and State agencies. Currently, the four most prominent existing island levee standards are listed below:

- φ **FEMA Hazard Mitigation Plan:** Meeting this standard allows the Delta island or tract to be eligible for FEMA disaster grants and assistance following levee failures and island inundation.
- φ **USACE Public Law 84-99:** Meeting this standard allows the Delta island or tract to be eligible for USACE funding for levee rehabilitation and island restoration following levee failures and island inundation, provided the reclamation district applies for and is accepted into the program and passes a rigorous initial inspection and periodic follow-up inspections. Both of the above two standards are based primarily on levee geometry with minimum freeboard and maximum steepness of slopes. Although the geometry implies a minimum slope stability factor of safety, neither standard is associated with a level of protection and neither addresses seismic stability.
- φ **FEMA 100-year (Base Flood) Protection:** This standard, often called the 1 percent annual chance flood level of protection, is based on criteria established in the Code of Federal Regulations and is often used with established USACE criteria to meet certain freeboard, slope stability, seepage/underseepage, erosion, and settlement requirements. Meeting this level of flood protection means that communities will not require mandatory purchase of flood insurance or be subject to building restrictions. This standard generally does not address seismic stability. Very few levees in the central Delta meet this standard.
- φ **DWR 200-year Urban Levee Protection:** This standard is similar to the FEMA standard, but for a 200-year level of flood protection. It is generally based on established USACE criteria. However, unlike USACE criteria, the DWR 200-year Urban Levee Protection requires that seismic stability be addressed. Not meeting this standard, or making adequate progress toward it, will generally prohibit further development behind an urban or urbanizing levee. Although almost

none of the levees in the central Delta meets this standard, most do not protect urban areas, with the exceptions of the outer fringes of the Delta near West Sacramento, Sacramento's Pocket Area, and Stockton.

It is likely more useful to properly align [economic land](#) and resource uses with specific [island](#) levee design criteria. This can help ensure that land and resource uses realize appropriate flood risk protection, but also signal that future alterations and changes to land and resource uses must remain in alignment with appropriate [ecosystem goals, economic sustainability and risk reduction-levee design](#) criteria. To that end, this section provides policies that address the alignment of land and resource uses with appropriate levee design criteria.

While most of the attention is typically directed toward flood risk reduction for life and property, [future efforts must be based upon economically based risk reduction measures which consider future drivers of change and flood protection is also a consideration for habitat](#) and ecosystem values and goals. Among other considerations, setback levees that expand flood conveyance capacity and reduce flood risk while providing ecosystem restoration and recreational opportunities are worthwhile (U.S. Army Corps of Engineers 2002).

### Problem Statement

[The status of many Delta levees condition to meet economic, social and ecological public needs cannot be assessed until further analyses are completed and a new levee classification system is established. are not adequately designed and/or maintained to protect the existing land and resource uses.](#)

### Policies

RR P4 [Once a new levee classification system has been established, A](#)ctions occurring after January 1, 2015 shall conform to the classifications defined in Table 71. Actions protected by Class 5 levees must conform by 2025 in accordance with the Central Valley Flood Protection Act of 2008 (Government Code section 65865.5(a)(3)).

**Table 7-1**  
**Levee Classifications for Land and Resource Uses**

Levee System Goals							Minimum Design Criteria
Levee System Classification	Description	Land Use					
		Wetlands/ Habitat	Agricultural	Infrastructure	Rural Residential Uses with less than 10,000 people <sup>c</sup>	Urban Residential Uses with more than 10,000 people <sup>c</sup>	
Class 1	No specific goal <sup>a</sup>	✓	NA	NA	NA	NA	Designed to manage the flood risk to the level appropriate for individual ecosystem restoration projects.
Class 2 <sup>b</sup>	HMP	✓	✓	NA	NA	NA	Current DWR nonurban levee design criteria.
Class 3	PL84-99	✓	✓	✓	NA	NA	Current DWR nonurban levee design criteria.
Class 4	FEMA – 100-year	✓	✓	✓	✓ <sup>d</sup>	NA <sup>d</sup>	Current DWR nonurban levee design criteria, and must be accredited by FEMA as providing protection from the 100-year flood event.

**Table 7-1**

**Levee Classifications for Land and Resource Uses**

Levee System Goals						Minimum Design Criteria	
Levee System Classification	Description	Land Use					
		Wetlands/ Habitat	Agricultural	Infrastructure	Rural Residential Uses with less than 10,000 people <sup>c</sup>	Urban Residential Uses with more than 10,000 people <sup>c</sup>	
<b>Class 5</b>	DWR – 200-year <sup>e</sup>	✓	✓	✓	✓ <sup>d</sup>	✓ <sup>d</sup>	Current DWR urban levee design criteria for the 200–year flood event. and must be accredited by FEMA as providing protection from the 100-year flood event

Notes:

NA: Denotes Not Acceptable

✓: Denotes Acceptable

HMP: Hazard Mitigation Plan. FEMA geometrical levee criteria.

PL84-99: Public Law 84-99 standards developed by the US Army Corps of Engineers.

FEMA-100-year: Levees accredited by FEMA as providing 100 year flood protection.

<sup>a</sup> Class 1 levees are designed to serve the need of the habitat, and may be allowed to periodically fail.

<sup>b</sup> Islands where Class 2 levees are appropriate include those, after adequate consideration, that are judged to have no specific Statewide interest and may not be reclaimed after a levee failure.

<sup>c</sup> Levee protection for legacy towns should be determined based on site specific needs (e.g., floodwalls) and financing available.

<sup>d</sup> Levees for areas with residential, commercial, and industrial businesses should comply with requirements contained in the Natural Resources Agency "Interim Levee Design Criteria for Urban and Urbanizing Areas in the Sacramento-San Joaquin Valley," and ultimately upgrade to at least Class 5 (Federal Emergency Management Agency 200-year).

<sup>e</sup> In accordance with the Central Valley Flood Protection Act of 2008 (Senate Bill 5, Machado)

**RR P5** Until the Department of Water Resources adopts criteria to define locations for future setback levees, any action located next to the land side of a levee shall demonstrate adequate area is provided to accommodate setback levees, as determined by a registered civil engineer or geologist.

## Flood Management Investment

The Delta is inherently flood-prone, but its levees protect its residents, its agricultural land, and energy, communications, and transportation facilities vital to the economic health of California (Public Resources Code section 32301(h)). Levee maintenance and improvements in the Delta are critical for reducing risks to acceptable levels. Depending on the ownership of the levee, the responsibilities for these activities—and the financial investment required—are assigned to state agencies and/or local landowners and reclamation districts.

Although many major levees are Project levees and managed by state agencies, 65 percent of the levees in the Delta are non-Project local levees. These levees are not part of the federal flood-control program and are maintained by local agencies (primarily reclamation districts) that are partially reimbursed by the State. It is difficult for local agencies to raise funds for the local share of state and federal assistance programs. Also, few Delta properties have federal or private flood insurance, and as a result, these uninsured property owners may be solely responsible for repairs and losses following a levee failure.



Although the State has expended ~~tens-hundreds~~ of millions of dollars since ~~2000-1988~~ on Delta levee operation, maintenance, and improvement, significant funding would still be needed to raise all Delta levees to PL84-99 standards. Given the potential threats faced by Delta levees, risk must be reduced through a set of management policies that prioritize strategic and focused investments of resources into levees economically based risk reduction actions in a manner that best balances the multitude of uses in the Delta. The State Council, in consultation with the Central Valley Flood Protection Board, is required to promote effective strategic levee investments and recommend prioritization of State investments (Water Code section 85305(a), 85306).

## **Problem Statement**

There is no clear state policy for ~~flood management~~ long-term sustainable risk reduction and state funding within the Delta. Priorities need to be set for state-funded ~~flood management~~ sustainable risk reduction investments.

## **Policies**

RR P6 In consultation with the Central Valley Flood Protection Board, the Council shall develop a strategic risk reduction investment plan that will identify potential improvements with the greatest public benefits, is economically and ecologically sustainable, and contributes to the achievement of the co-equal goals. The strategic investment plan shall~~An action utilizing State investments for levee improvements in the Delta shall:~~

- φ Reduce risk of loss of life.
- φ Not result in an increase in the number of people at risk.
- φ Recognize the wide variability of conditions across the Delta, including: depth of inundation upon failure; current height and condition of existing levees; degree of exposure to seismicity, sea level rise, climate change, and river flood levels; the ability of land uses to recover from short or long-term inundation, and the consequences to water quality, critical utilities and transportation corridors.
- φ Evaluate investment in alternative ~~flood management~~ risk reduction strategies, comparing levee upgrade to flood-proofing, acquisition and conversion to habitat; subsidence reversal; relocation of infrastructure, and flood insurance.
- φ Evaluate long-term drivers of change and economic sustainability before establishing funding priorities
- φ Integrate risk reduction investments with the co-equal goals through the coordinated evolution of some islands to habitat.

## **Emergency Preparedness and Response**

Emergency preparedness is the first line of flood defense. It is imperative that federal, State, and local governments—the citizens themselves—be prepared for a variety of emergency situations. Emergency response should be routinely tested and practiced (Delta Vision Blue Ribbon Task Force 2008).

To effectively and reliably reduce risks to people, property, and state interests in the Delta, a multifaceted strategy of coordinated emergency preparedness, appropriate land use planning, and prioritized investment in ~~flood protection~~ risk reduction infrastructure is necessary and prudent. Delta levees not only protect life and personal property, but ~~also a few select levees~~ play a large role in protecting vital infrastructure, including the State's water conveyance system. Despite the risks of levee failure, no published emergency action plan exists that addresses the consequences to federal and State water supply

deliveries of catastrophic levee failure in the Delta. Although investment in flood-protection risk reduction measures and infrastructure can considerably reduce the likelihood of a-catastrophic losses levee failure, failures are inevitable and will require the implementation of well-coordinated and carefully developed emergency response planning efforts. To reduce response time while optimizing the effectiveness of the response effort, such plans will need to harness the unique capabilities of each agency with a mission in the Delta.

Despite the vital importance of adequate preparation, no updated Delta-wide emergency response plans currently under development need to be published-exists. The California Emergency Management Agency, Department of Water Resources, and several local agencies are preparing individual emergency response plans for the Delta, but the development of these should be coordinated, tested, and practiced. Strategies being prepared as directed by SB27 will address this issue, and will be considered in the Delta Plan.

### **Problem Statement**

Levee failures and flooding can and will place human life and property in danger, and On a long-term basis, certain specific levee breaches which are left open to the tides can also have potentially significant implications for the State's water supply and may help the health of the Delta ecosystem. Current land use activities which exacerbate land subsidence and increase the forces on levees further increase the probability and damages associated with levee failure.

### **Policies**

At this time, there are no policies with regulatory effect included in this section.

### **Recommendations**

RR R3 The following actions should be taken to promote emergency preparedness in the Delta:

- φ The Department of Water Resources and local flood management agencies should prepare and regularly update *Delta Multi-Hazard Coordination Plans and Inland Mass Evacuation Plans*; and participate in "Golden Guardian"-like emergency response exercises, Inland Mass Evacuation exercises, and emergency preparedness public training, notification, and outreach programs.
- φ The Department of Water Resources should complete their Delta Flood Emergency Preparedness, Response and Recovery Program addressing a wide range of emergency response strategies, being undertaken in coordination with the Corps of Engineers Delta Emergency Operations Plan, local emergency operations plans and water stakeholders. The Program would improve response and recovery time for impacts to life, property, critical infrastructure and environment in the Delta, and water supply interests reliant on the Delta.
- φ The Department should coordinate with state and federal agencies and water interests reliant on the Delta to implement an emergency freshwater pathway to export facilities considering unique needs and priorities in the event of a catastrophic multi-island failure.
- φ• In consultation with local agencies, the Department of Water Resources should expand their emergency stockpiles for repair of levee breaches and seismically-induced levee slumping in response to catastrophic levee failures, and to make them regional in nature and usable by a larger number of agencies. The Department, as a part of this plan, should evaluate the potential of creating stored material sites by "over-reinforcing" western delta levees.

- φ State and local agencies and regulated utilities that own and/or operate infrastructure within the Delta should prepare emergency response plans to protect the infrastructure from longterm outages resulting from failures of the Delta levees. The emergency procedures should consider methods that also would protect Delta land use and ecosystem.
- φ Responsible Emergency Management Authorities should consider and implement the recommendations of the Delta Multi-Hazard Coordination Task Force (Water Code section 12994.5).

## Limitation of Liability

The U.S. Army Corps of Engineers and other federal agencies are afforded immunity from liability of any kind for damages arising from flood events through the provisions of the Flood Control Act of 1928. However, this immunity is not enjoyed by parties outside of the federal government.

The most notable recent court decision on flood liability was the November 2003 *Paterno vs. State of California* decision. The California Court of Appeals found the State liable, by inverse condemnation, for damages incurred by flooded residents as a result of failure of a Yuba River levee that the State did not design, build, or even directly maintain. This decision makes it possible that the State will ultimately be held responsible for the structural integrity of much of the federal flood-control system in the Central Valley—approximately 1,600 miles of State-Federal project levees that protect more than half a million people and property exceeding \$50 billion in value.

In another California court case, *Arreola vs. Monterey County*, local agencies were held liable in July 2002 for 1995 flood damages to property owners that resulted from a failure to properly maintain the Pajaro River project.

## Problem Statement

As the risks of levee failure and corresponding damage increase, California's courts have generally exposed public agencies, and the State specifically, to significant financial liability for flood damages (California Department of Water Resources 2005).

## Policies

At this time, there are no policies with regulatory effect included in this section.

## Recommendations

- RR R4 The Legislature should provide specific immunity for public safety flood protection activities, similar to that provided for police and correctional activities (Government Code section 844), and fire protection activities (Government Code section 850).
- RR R5 The Legislature should require an adequate level of flood insurance for individuals, businesses, and industries in floodprone areas.

## Financing of Local Flood Management Activities

No regional authority exists to facilitate the assessment and disbursement of funds for Delta [risk reduction measures](#), levee operations, maintenance, and improvements, or to collect and provide timely data and reporting on levee conditions. Such an authority could act to consolidate activities relating to [subsidence control](#), levees conditions assessment, data collection efforts, emergency preparedness notification, and fee authority. This could provide for a more [centralized-progressive](#) and responsive entity [managed-on-a-local-basis](#) for Delta interests [and long-term sustainability](#).

## Problem Statement

~~Financing~~ The economic justification to support the continued public funding of all local levee operations, maintenance, and ~~related data collection efforts is not well coordinated~~ improvements has not yet been conducted. Once economically based risk reduction priorities are established, a coordinated plan and effort to achieve a reduction in losses needs to be developed.

## Policies

At this time, there are no policies with regulatory effect included in this section.

## Recommendations

RR R6 A Delta Flood Management Assessment District should be created with fee assessment authority (including over state infrastructure) to provide adequate flood control protection economically based risk reduction measures and emergency response for the local and regional benefit of participants within the Delta.

This district should be authorized to:

- φ Develop, fund, and implement a regional plan of economically based risk reduction flood management for both Project and nonProject levees of the Delta in cooperation with the existing reclamation districts, cities, counties, and owners of infrastructure protected by the levees;
- φ Survey levees and report survey and conditions data to the Department of Water Resources at least every 5 years;
- φ Perform a beneficiary pay analysis for on-going anthropogenic changes which are increasing flood risk;
- φ In coordination with the Department of Water Resources and Corp of Engineers, establish standardized flood risk measurement data. This data should support the development of Expected Annual Damage values for the Delta. Expected Annual Damage is a measure of risk that integrates the likelihood and consequences of flooding, and is also the standard measure of the benefits of reducing flood risk; Expected Annual Damage estimates will include a comparative analyses of losses from on-going subsidence, water quality degradation and foregone ecosystem opportunities associated with maintaining the existing plan form versus a more economically sustainable form.
- φ Notify residents and landowners of flood risk on an annual basis;
- φ Develop emergency procedures including but not limited to evacuation.

Note that the Council is recommending in the Finance Plan (FP R4) that the proposed agency be given funding (up to \$110 ?? million) to develop and implement a strategic risk reduction investment plan that will identify potential improvements with the greatest public benefits, is economically and ecologically sustainable, and contributes to the achievement of the co-equal goals. the regional plan.

## Subsidence Reduction and Reversal

Much of the central Delta lands are composed of peaty soils that exist naturally as fibrous, low-density, compressible soils usually in a saturated state. To grow crops in such soils, farmers constructed levees and dikes around the tracts and drained the fields. Drying saturated peat reduces its volume by 50 percent. Early cultivation practices included burning, which further reduced the volume and altered the structure. Over time, long-term oxidation chemically reduced the peaty soils to small particles and gases that blew

away gradually. Today, much of the central Delta is below sea level, with some islands commonly 12 to 15 feet [and as much as 30 feet](#) below sea level, requiring levees that are 20 to 25-feet high [or higher](#) to hold back water every day. However, some recent practices that can reverse subsidence have been investigated. The State is participating in subsidence reversal pilot studies on Sherman and Twitchell islands and other areas.

### ***Problem Statement***

Agricultural practices have promoted deep subsidence over the last 150 years. Although subsidence has slowed or halted in many areas, some regions of the Delta [and Suisun Marsh](#) continue to subside [causing a significant increase in risks and damages to public interests. The costs associated with either historic or current subsidence have been born substantially by the general public and not by the local beneficiaries.](#)

### ***Policies***

At this time, there are no policies with regulatory effect included in this section.

### ***Recommendations***

RR R7 State agencies should not renew or enter into agricultural leases on western Delta islands that promote or contribute to subsidence on the leased land unless the lessee participates in subsidence-reversal or reduction programs.

φ [Perform a beneficiary pay analysis for on-going anthropogenic changes which are increasing economic and ecological risks;](#)

## **Reoperation of Upstream Reservoirs and Peak Flow Attenuation to Improve Flood Management**

The federal and State agencies have initiated evaluations to modify flood control management procedures on an individual stream basis but have not completed a comprehensive Delta watershed analysis. How reservoirs upstream of the Delta are operated can have substantial impacts on flood flows through the Delta; therefore, operations procedures among the responsible authorities should be well coordinated.

### ***Problem Statement***

Flood and water supply operations are not well coordinated between State and federal entities.

### ***Policies***

At this time, there are no policies with regulatory effect included in this section.

### ***Recommendations***

RR R8 U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, and Department of Water Resources should modify flood control management procedures for reservoirs upstream of the Delta considering sea level rise, changes in precipitation, and changes in water supply operations.

## **Performance Measures**

φ Percentage of Delta levees that comply with the protection classifications shown in Table 7-1 based on land and resource uses.

- φ Percentage of residential and commercial structures covered by flood insurance in the Delta.
- φ Decrease in Delta area flood risk over time as measured by Expected Annual Damage.
- φ The development of written emergency preparedness and response plans and the frequency of emergency preparedness drills.
- φ Percentage of floodplains or floodways defined and regulated to protect flood capacity.

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AGENDA ITEM 7  
APPENDIX A  
THIRD STAFF DRAFT DELTA PLAN